

DOCUMENT RESUME

ED 253 426

SE 045 393

TITLE Problem Solving Handbook for Grades 3-6 Mathematics. Curriculum Support Series.

INSTITUTION Manitoba Dept. of Education, Winnipeg.

REPORT NO ISBN-C-7711-0158-9

PUB DATE 84

NOTE 220p.

PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC09 Plus Postage.

DESCRIPTORS Answer Keys; Curriculum Development; Elementary Education; *Elementary School Mathematics; *Intermediate Grades; *Mathematics Instruction; *Problem Sets; *Problem Solving; *Resource Materials; Teacher Developed Materials; Teaching Methods

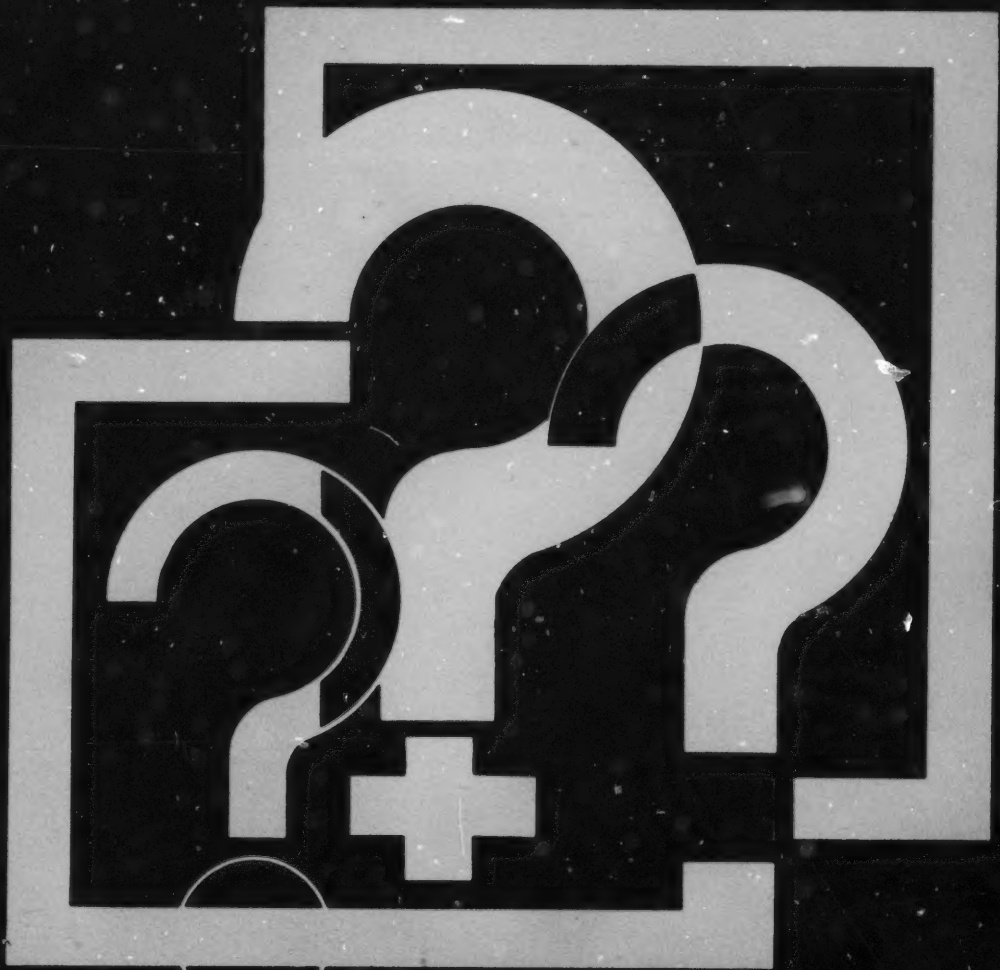
IDENTIFIERS Manitoba

ABSTRACT

This handbook, developed by teachers in Manitoba, has been structured to provide teachers in grades 3 through 6 with a resource for teaching problem solving in mathematics. It consists of four sections. The first section establishes the background and states the purposes of the handbook. The second section provides a general overview of problem solving. It identifies two types of problems (routine and nonroutine) and outlines the step generally used to solve problems. Also described, with examples, are key problem-solving strategies commonly used in grades 3 through 6. The third section includes sheets of selected problems for each grade. Most of these problems are sorted according to strategies and are structured to interface with key mathematics topics in the curriculum. A curriculum chart for each grade is given, and additional sheets of problems, not identified with specific strategies, are also included. The fourth section contains a list of reference materials on problem solving. (MNS)

* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *

problem solving handbook for grades 3—6 mathematics



"PERMISSION TO REPRODUCE THIS
MATERIAL HAS BEEN GRANTED BY

K. A. Osens

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)"

province of manitoba
department of education 1984

SE

PROBLEM SOLVING HANDBOOK
FOR
GRADES 3 - 6 MATHEMATICS

1984

PROVINCE OF MANITOBA
DEPARTMENT OF EDUCATION

ISBN 0-7711-0158-9

ACKNOWLEDGEMENTS

The Department of Education acknowledges with appreciation the contribution of all people who assisted in the production of the Problem Solving Handbook for Grades 3 to 6 mathematics.

Members of the Committee

Linda Burnell - Fleming School, Brandon
Betty Johns - University of Manitoba, Winnipeg
Shirley Maurice - Ryerson School, Winnipeg
Glenn Matsumoto - Bertrun E. Glavin, Winnipeg
Pat Tennyson - R.H.G. Bonnycastle School, Winnipeg
Cecile Ungrin - University of Manitoba, Winnipeg
Linda Walker - Emerson School, Winnipeg
Bob Watson - Lakewood School, Winnipeg
Bob McIntosh - Department of Education, Winnipeg
Peter M. Luba, Chairperson - Department of Education, Winnipeg

Reviewers

Vicky Adams - Inkster School, Winnipeg
Earl Bass - J. R. Reid School, Brandon
Randy Beynon - Lakewood Elementary, Winnipeg
Frank A. Foidart - Swan Lake Elementary, Swan Lake
Pat Jackson - Inglis Elementary, Inglis
Joan Murash - Greenway School, Winnipeg
Ed Muzyczka - Victor Wyatt School, Winnipeg
Elaine Robinson - Bonnycastle School, Winnipeg
Barry H. Witzke - Major Pratt School, Russell
John Zubadiac - David Livingstone School, Winnipeg

CONTENTS

STRUCTURE OF THE HANDBOOK	1
INTRODUCTION TO THE PROBLEM SOLVING HANDBOOK	5
OVERVIEW OF PROBLEM SOLVING	9
PROBLEM SOLVING STRATEGIES	15
PROBLEM SOLVING SHEETS - GRADE 3	35
Answer Sheets for Above	50
ASSORTED PROBLEMS - GRADE 3	61
Answer Sheets for Above	70
PROBLEM SOLVING SHEETS - GRADE 4	77
Answer Sheets for Above	96
ASSORTED PROBLEMS - GRADE 4	109
Answer Sheets for Above	118
PROBLEM SOLVING SHEETS - GRADE 5	125
Answer Sheets for Above	142
ASSORTED PROBLEMS - GRADE 5	163
Answer Sheets for Above	168
PROBLEM SOLVING SHEETS - GRADE 6	171
Answer Sheets for Above	190
ASSORTED PROBLEMS - GRADE 6	211
Answer Sheets for Above	220
REFERENCE LIST	227

STRUCTURE OF THE HANDBOOK

STRUCTURE OF THE HANDBOOK

This handbook has been structured to provide the teachers of mathematics (3-6) with the most recent research findings on problem solving. It contains information on strategies and practical applications which are the key notions of problem solving learning in mathematics.

The handbook consists of four sections:

The first section establishes the background and states the purposes of the handbook.

The second section provides a general overview of problem solving. It identifies two types of problems and it outlines the steps which are generally used to solve problems. This section also identifies and describes, with examples, the key problem solving strategies which are commonly used to solve problems in grades 3 to 6 mathematics.

The third section includes sheets of selected problems for each grade. Most of these problems are sorted according to strategies and are structured to interface with the key topics of the mathematics curriculum. A curriculum chart for each grade is designed to assist the teacher with the interfacing process. Additional sheets of problems in each grade section, which do not identify with specific strategies, are included also.

The fourth section contains a list of reference materials on problem solving. In this section teachers can identify with various resources which could be of value to them in their problem solving programs.

The content of this handbook has been designed to be of practical use to the classroom teacher.

HOW TO USE THE HANDBOOK

The introductory section provides information which will be useful to the teacher in achieving the goals of an effective problem solving program.

The overview section contains information which will help the teacher with problem types and problem solving strategies. The problem examples are designed to illustrate how strategies are used in the solution of problems.

The main section of this handbook provides a variety of problems at each grade level. As mathematical topics are taught, the teacher can choose problems in the handbook which relate to each topic. The selection is facilitated by the presence of curriculum charts at the beginning of each grade level. The charts interface the problems with mathematical topics and problem solving strategies.

INTRODUCTION TO THE PROBLEM SOLVING HANDBOOK

INTRODUCTION TO THE PROBLEM SOLVING HANDBOOK

BACKGROUND

The Manitoba Mathematics Guide (K-6) has as its main objective the meaningful development of mathematical concepts and skills. Emphasis is placed on the development of problem solving.

The National Council of Teachers of Mathematics in its "Agenda for Action" brought to the attention of all educators the need for improving problem solving skills in the eighties. Consequently, in 1980 the Manitoba Association of Mathematics Teachers and the Department of Education jointly sponsored the Gimli seminar on problem solving which was attended by representative teachers from all school divisions in Manitoba. Following the seminar, a series of in-services dealing with problem solving was initiated by teachers in more than 40 school divisions with support from the Department of Education.

Teachers who attended these divisional in-services expressed the need for more specific help in problem solving. This handbook is designed to provide guidance and give direction to Grade 3-6 teachers in their approach to teaching problem solving. Its content is interfaced with the main topics of the Manitoba Mathematics Guide.

PURPOSES OF THE HANDBOOK

The purposes of this handbook are:

- to establish a better awareness of the meaning of problem solving
- to develop an awareness of various problem solving strategies
- to provide a supply of relevant problems
- to promote the creation of a learning atmosphere which facilitates inquiry
- to use problem solving as a bridging component among various strands of mathematics and other areas of learning
- to develop the skills necessary to solve problems through active involvement
- to promote and maintain a positive attitude toward solving problems.

OVERVIEW OF PROBLEM SOLVING

OVERVIEW OF PROBLEM SOLVING

WHAT IS A PROBLEM?

A problem is a situation in which a person wants something and needs to experience one or more actions in order to get it.

Four elements are involved in the definition of a mathematical problem

1. The situation must involve mathematics.
2. The situation must exist involving an initial state and a goal state.
3. There must be some blockage between the given and desired states.
4. A solution must be desired.

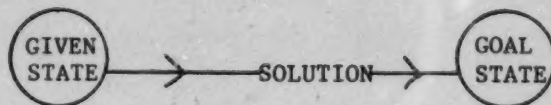
TYPES OF PROBLEMS

There are two types of problems.

Type 1

In the first type, the solution to the problem appears to be quite obvious. Known procedures are used to solve the problem.

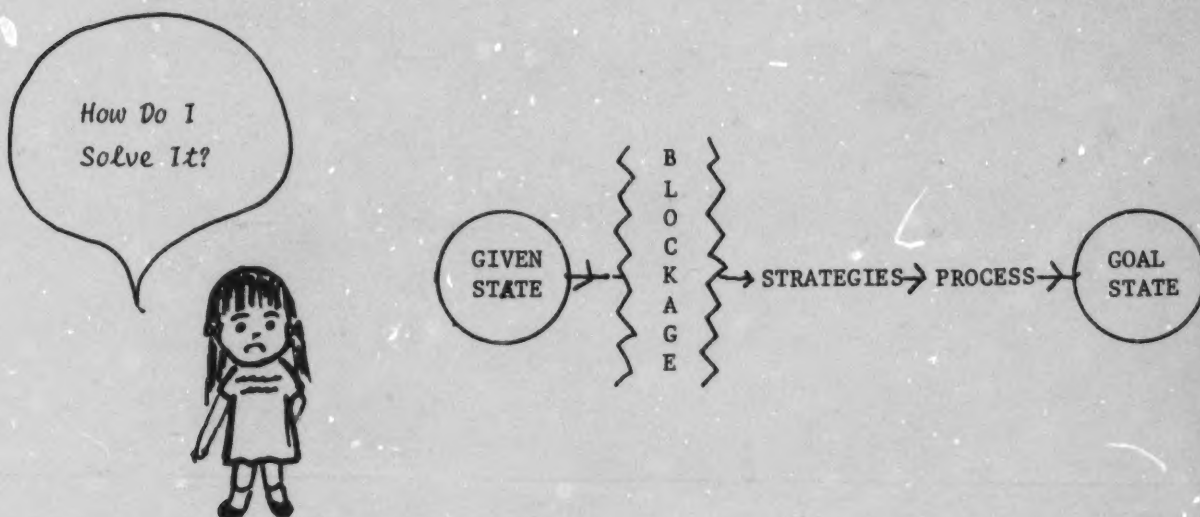
Aha, I know
how to do it!



Many problems included in elementary school texts are Type 1. They are generally story problems. It is not too surprising that many problems still center around Type 1 since they are designed to develop application of calculation skills.

Type 2

In the second type, an individual is confronted with a situation where the solution is not obvious and the individual is not aware of a standard procedure to solve the problem. In other words, there is a blockage between the given and goal state. In order to determine a solution the individual applies one or more strategies until the solution is found.



One should not get caught in the apparent dichotomy of Type 1 versus Type 2 problems, for this division is not a distinctive feature of problem solving in the elementary grades. Both are important and have their place in a problem solving program.

Development of proficiency in problem solving is continuous. Thus, students should begin to acquire this proficiency through consistent engagement in problem solving in their mathematics studies.

STEPS GENERALLY FOLLOWED WHEN SOLVING PROBLEMS

Developing an awareness of certain problem solving strategies will help the students build skills and gain the necessary knowledge to be able to solve problems. The steps generally followed are:

Understand Problem

1. Visualize: represent situation concretely, pictorially or mentally.
2. Discuss vocabulary
3. Interpret - what is known?
 - what is the question to be answered?
 - what is not known?

Decide on Strategy

Apply Strategy

1. Estimate where feasible (round off)
2. Solve the problem

Check Solution

1. Does it answer the question?
2. Is the answer reasonable (compared with estimate)?
3. Is the solution accurate?

Conclusion

1. Discuss solution(s)
2. Discuss other possible strategies which could have been used.

PROBLEM SOLVING STRATEGIES

PROBLEM SOLVING STRATEGIES

Strategies are techniques for solving widely dissimilar problems of varying degrees of difficulty. They include procedures that, when used, make a problem clearer, simpler and more manageable..

Four characteristics of a strategy approach to problem solving are:

1. strategies are process skills that can be learned
2. strategies may be used in a variety of problems
3. a variety of strategies may be used to solve a single problem
4. strategies may be used singly or in combinations to solve a single problem.

In general, strategies give the individual the tools with which to begin and to continue productive work in problem solving. Many students unconsciously use strategies when solving problems. However, they will develop better problem solving skills by becoming more aware of the specific strategies. As students develop these skills progressively, they will concurrently develop analytical thinking skills.

The following are some of the key strategies commonly used in grades 3 to 6.

- Guess and Check
- Look for a pattern
- Act it out
- Diagram (Draw/Graph)
- Write a number sentence
- Make a model
- Make a table
- Solve a simpler, related problem
- Work backwards
- Account for all possibilities

In the following pages each of the above strategies is described and sample problems, with solutions, are given to show how the strategy is used to solve a problem.

STRATEGY: GUESS AND CHECK

A guess and check approach requires the students' careful attention to the pertinent information of the problem. This should result in a trial answer which often is close to the solution. The next step in the process is to check the guessed answer against the problem conditions to determine if it is reasonable. If the answer is not reasonable the process is repeated until the correct solution is obtained.

Problem 1

Place the numbers 1 to 9 into the squares of the grid below so that the sum of three numbers in any direction (horizontal, vertical, diagonal) is the same.

Solution

4	9	2
3	5	7
8	1	6

Other solutions are possible.

Problem 2

Draw a line or make a loop around any set of three adjoining numbers which add up to 20.

Solution

7	9	6	5	7
4	5	9	4	9
8	7	9	6	5

Other solutions are possible.

STRATEGY: LOOK FOR A PATTERN

To look for a pattern involves examining a series of shapes, colours, numbers, or a combination thereof, and ascertaining whether a pattern emerges and repeats.

Problem 1

Continue the pattern:



Problem 2

Continue the series:

1, 3, 6, 10, 15, __, __, __.

Problem 3

If there are 15 people in a room and each person shakes hands once with every other person, how many handshakes will there be in all?

Solution

Start the solution by using 2 students, 3 students, 4 students, etc. until a pattern is discovered.

STRATEGY: ACT IT OUT

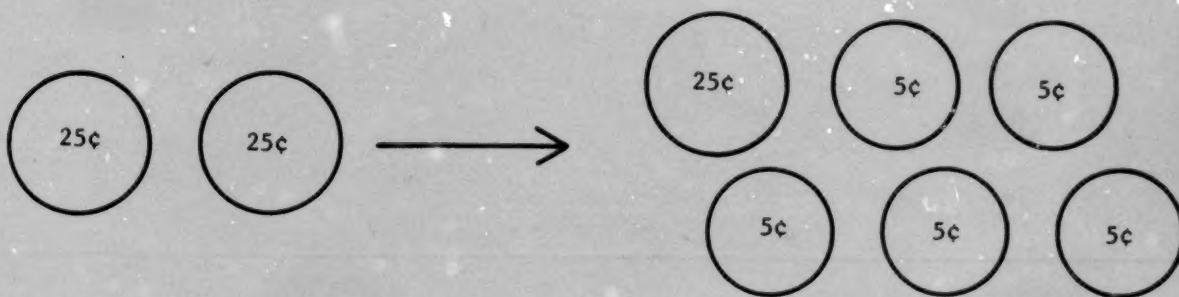
To act it out involves going through actions which give the problem "concreteness". This concreteness makes it easier to discover relationships leading to a solution.

Problem 1

How can you make change for 50¢ using 6 coins? 7 coins? 8 coins?

Solution

Using 6 coins



Act it out similarly using 7 coins and 8 coins.

In each case there may be more than one solution.

Problem 2

If there are 10 people in a room and if each person shakes hands once with each of the people, how many handshakes are given in all?

Solution

Students can act out the problem and in this way determine the solution.

This problem was used also to illustrate the strategy "Looking For A Pattern".

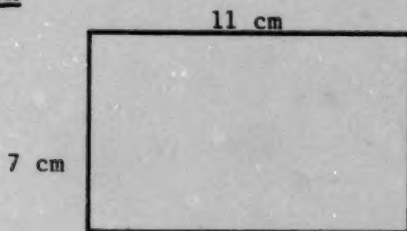
STRATEGY: DIAGRAM (DRAW/GRAPH)

Diagramming is the depicting of given information in a diagram, drawing or graph. The diagram, drawing or graph illustrates a connection between pieces of given information which lead to the solution.

Problem 1

A light switch cover is 7 cm wide and 11 cm long. Find the perimeter of the light switch cover. What other dimensions can the light switch cover have and still have the same perimeter? (Show four examples)

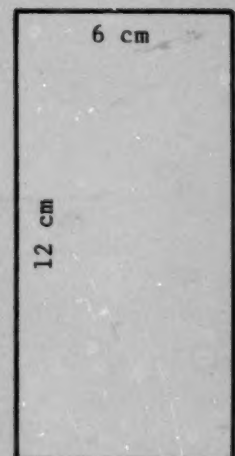
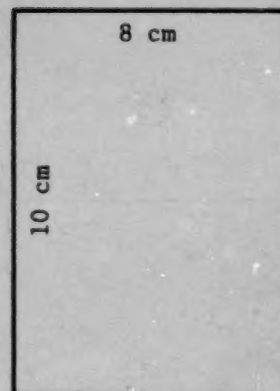
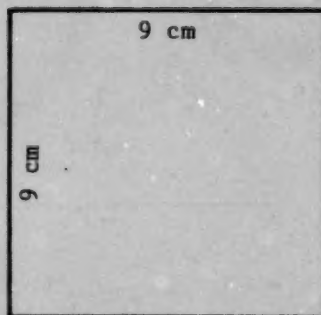
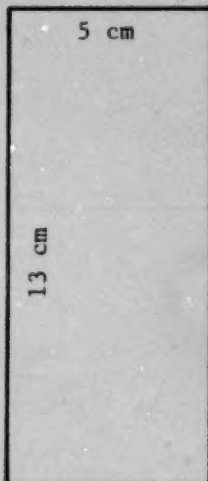
Solution



$$\begin{aligned}\text{Perimeter is } & 7 + 11 + 7 + 11 \\ & = 7 + 7 + 11 + 11 \\ & = 14 + 22\end{aligned}$$

Perimeter is 36 cm

Other Dimensions



Still other dimensions are possible, though they may not be practical.

Problem 2

Temperatures on May 10, 1983 were as follows:

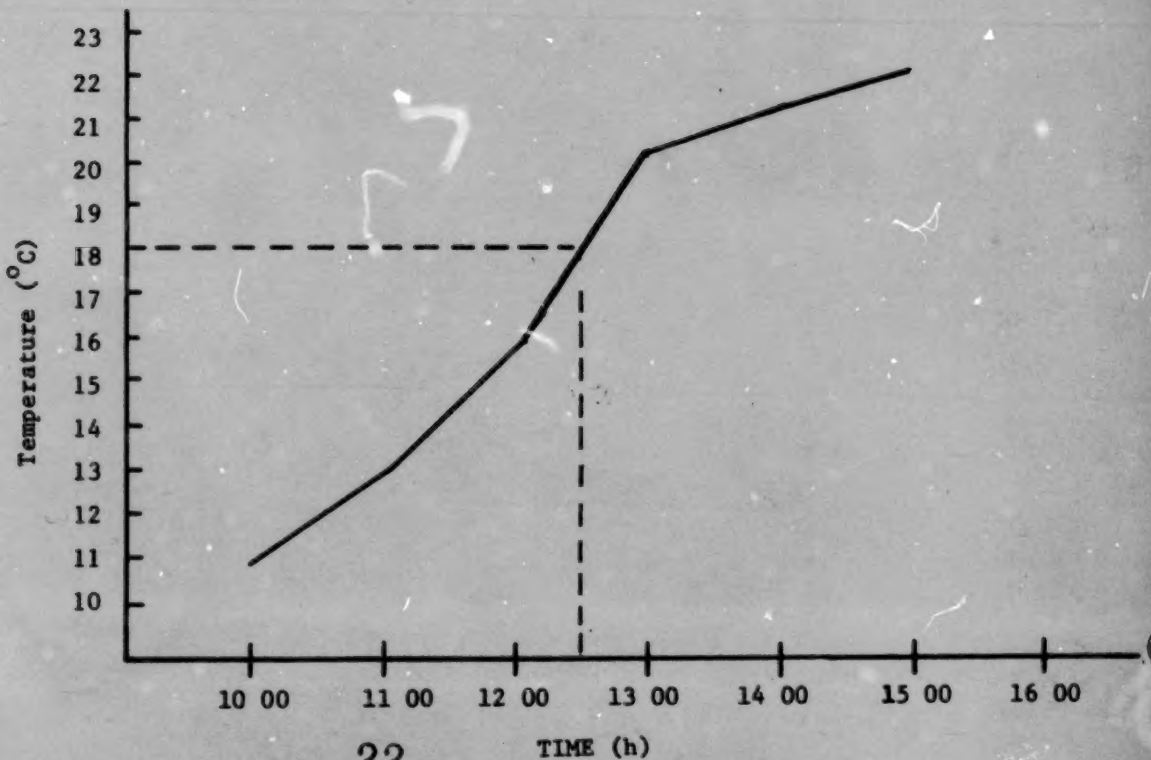
10 00 h	-	11°C
11 00 h	-	13°C
12 00 h	-	16°C
13 00 h	-	20°C
14 00 h	-	21°C
15 00 h	-	22°C

At what time would the temperature have been 18°C

(Assume the rate of rise of temperature is constant during each hour.)

SOLUTIONTEMPERATURE VARIATION

May 10, 1983



STRATEGY: WRITE A NUMBER SENTENCE

Solving a problem by writing a number sentence is usually arrived at after one or more strategies have been applied. The problem is abstracted from a written statement to a number sentence.

Problem 1

Jan had 35 balloons for her party. There were 7 children at the party. Each child gets the same number of balloons. How many balloons does each child get?

Solution:

Using a drawing and trial approach, divide 35 balloons into seven equal groups.



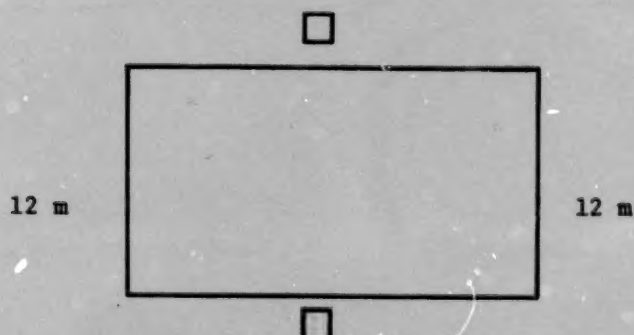
or $35 \div 7 = \boxed{}$

Alternate Solution:

Represent the problem on a number line and then write a number sentence.

Problem 2

You are in a rectangular room with perimeter 60 m. If the width measures 12 m, what is its length?

Solution:

$$60 = (2 \times 12) + (2 \times \boxed{})$$

$$\boxed{} = 18$$

Length is 18 m.

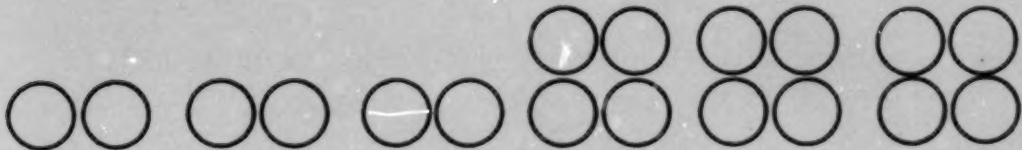
MAKE A MODEL

Making a model is a way of visualizing a problem by representing it concretely or pictorially.

Problem 1

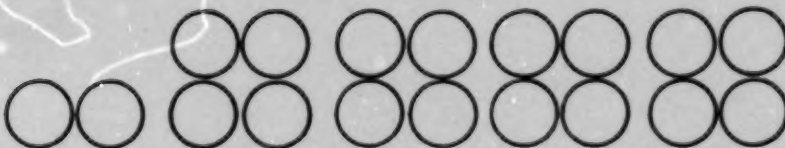
Tim counted 18 wheels on the cars and bicycles which passed his school between 15 00 h and 15 15 h. How many cars and bicycles went by the school?

Solution 1



Answer: 3 bicycles and 3 cars

Solution 2



Answer: 1 bicycle and 4 cars

Other solutions are possible.

Markers, coins, play money, or other materials can be used to develop a model.

Problem 2

There are 32 windows in 4 rows on one side of a greenhouse. A hailstorm broke 5 windows in row one, $\frac{3}{8}$ of the windows in row two, 6 windows in row 3, and left $\frac{1}{2}$ of the windows in row 4 unbroken. What fraction of the windows remained unbroken?

Solution

Row 1	X		X		X		X	X
Row 2		X		X		X		
Row 3	X	X	X	X	X	X		
Row 4		X		X		X		X

18 of 32 windows are broken

14 of 32 windows are unbroken

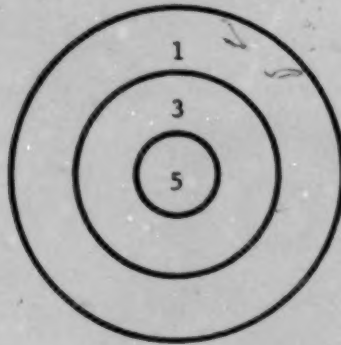
$\frac{14}{32}$ or $\frac{7}{16}$ of the windows remain unbroken.

MAKE A TABLE

Making a table involves organising data in table form. It is an efficient way of classifying data which will lead to the solution.

Problem 1

What scores are possible if 3 bean bags are thrown on the board and they land within the numbered areas?



Solution

1	3	5	Score
x x x			3
x x	x		5

Other scores are possible.

Problem 2

Sufficient material is available to make 80 m of fence around a garden. What would the dimensions of the garden have to be if it is to have the greatest possible area?

Solution

Width	Length	Area (m^2)
1	39	39 m^2
5	35	175 m^2
10	30	300 m^2
15	25	375 m^2
20	20	400 m^2
25	15	375 m^2

The garden would be a square with 20m sides.

ACCOUNT FOR ALL POSSIBILITIES

Accounting for all possibilities involves systematic search for all possible solutions. It is usually achieved by constructing a table and looking for a pattern.

Problem 1

Jim wants to buy a bag of candies from the candy machine. It costs 50¢. The machine takes nickels, dimes and quarters in any combination. List all possible combinations of coins Jim can use to pay for the candy.

Solution

Quarters	Dimes	Nickels
2		
1	1	3
1	2	1

Other solutions are possible.

Problem 2

Cars and bicycles are parked in the school parking lot. There are 50 wheels in total. How many combinations of cars and bicycles are possible?

Solution

Bicycles	Cars
1	12
3	11
5	10

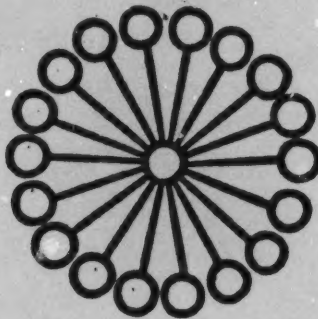
Other solutions are possible.

SOLVE A SIMPLER RELATED PROBLEM

Solving a simpler related problem involves setting aside the original problem and working through a simpler related problem. The same solution method is then applied to the original problem.

Problem 1

Place the numbers 1 to 19 into the 19 circles so that any row of three numbers passing through the centre will give the same sum.

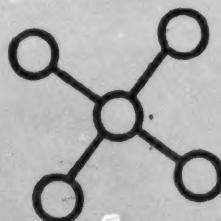


Solution:

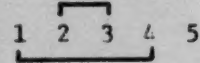
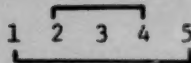
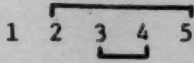
One is faced with two tasks: to determine the common sum for each row of spokes (three circles in a line) and then to place 19 numbers into the correct circles. The number of possibilities for each task are so many that use of guess and check and other strategies becomes impractical.

Therefore, one will solve first a simpler related problem in the following way.

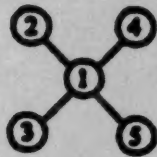
Place the numbers 1 to 5 into five circles so that any three numbers in a row have the same sum.



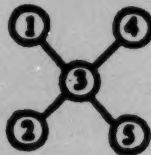
Since the number that goes in the middle circle will appear in both sums, the problem can be simplified still further by choosing number pairs from 1, 2, 3, 4, 5, that give the same sum. There are three possibilities.



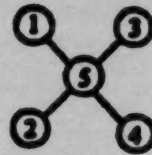
These three possibilities result in these solutions:



Sums are 8



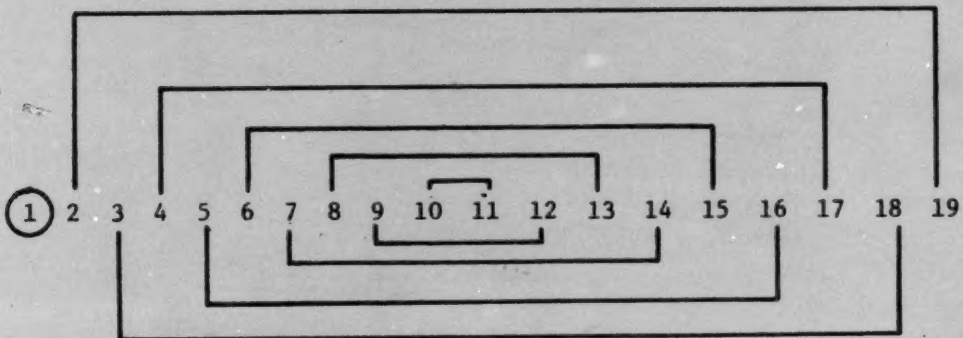
Sums are 9



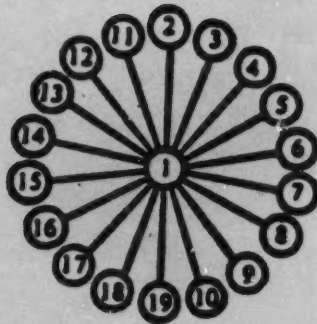
Sums are 10

The solution process for this simpler case can be used to determine the relationships in the more difficult problem. By looking at the sequences above, the smallest and the largest numbers are paired, then next smallest and largest. The remaining number in each case became the number in the middle circle. The number of choices in the middle circle were the first number (1), the middle number (3), and the last number (5). These three selections were the only possibilities for the middle circle number.

Based on the above simpler problem, the solution to the original problem is determined by selecting (1) for the middle circle and by pairing the largest and smallest numbers which give the same sum.



The spoke diagram becomes



Sums of 22

Other solutions are possible.

WORK BACKWARDS

In problem solving working backwards involves determining how the action or process ends and then working from the end position to the solution.

Example 1

If the number pattern is continued until the star is reached, what number will be on the starred square? Determine the number without filling in or counting the numbers for all the squares.

			8	7	6
					5
					4
	*	36			3
					2
					1

Solution:

Hint: Follow the arrowed path to 36.

			8	7	6
					5
					4
	*	36			3
					2
					1

Work backwards from 36 to the starred square.

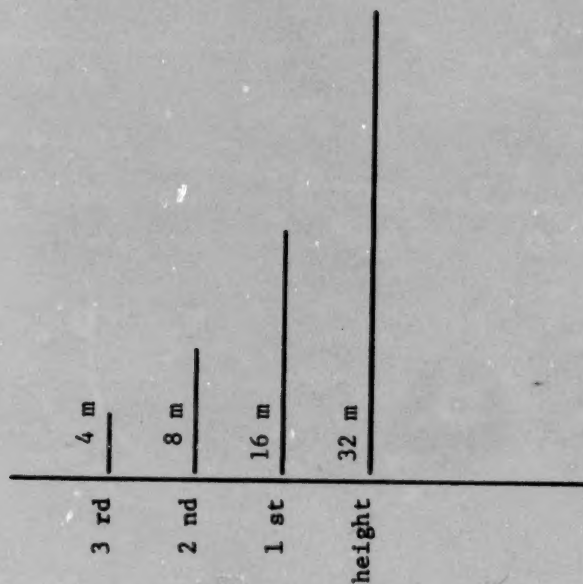
Answer is 29.

Problem 2

A bouncing ball is dropped from the top of a building. Each time it contacts the ground it bounces back to a height which is half the distance from which it last fell. If it bounces 4 m high on the third bounce, from what height was it dropped?

Solution

Draw the third bounce, then proceed to draw the second and then to first.



Ball was dropped from a height of 32 m.

PROBLEM SOLVING SHEETS

GRADE 3

CURRICULUM CHART: GRADE 3

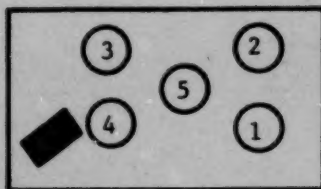
CURRICULUM TOPICS										STRATEGIES							
PROBLEM SHEETS	Counting	Place Value	Whole Number Operations	Estimating and Rounding Off	Patterns	Fractions	Decimals	Graphing	Measurement	Geometry	Guess and Check	Look for a Pattern	Act it out	Diagram (Draw-Graph)	Write a Number Sentence	Make a Model	Make a Table
1	o	o	o							o	x		v			v	
2	o				o					o	v	x					
3	o		o				o				v		x				
4	o		o					o	o		v		v	x		v	
5	o		o		o	o	o		o		v				x		
6	o		o		o	o			o	o			v	v		x	
7			o		o				o	o	v		v				x

o - curriculum topic
x - key strategy
v - alternative strategy

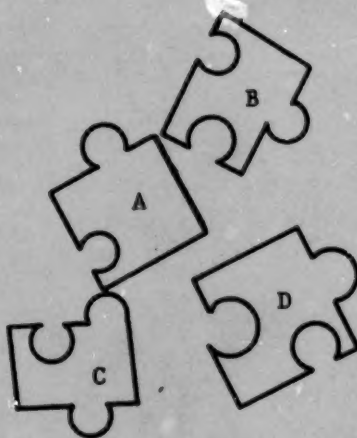
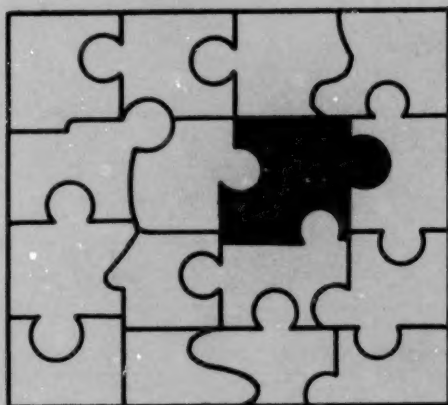
30 Assorted Problems

PROBLEM SOLVING SHEET 3.1GUESS AND CHECK

1. A number is less than 470. It has the digits 8, 4, 5.
What is the number?
2. By throwing 3 beanbags on the board, how can you get a score of 12 if each bean bag falls on a number?



3. Which puzzle piece will fit in the hole?

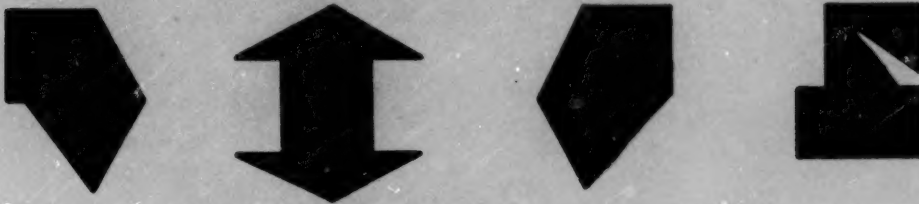
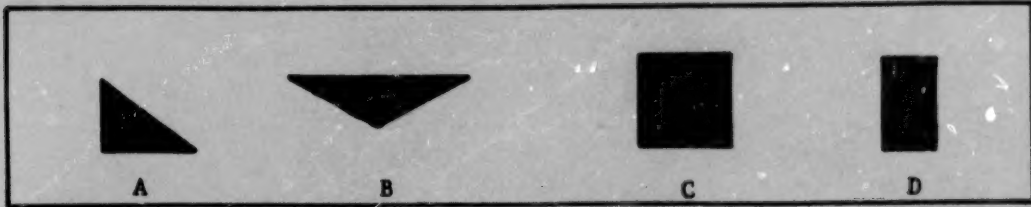


4. Using the numbers 3 4 6 7, put one number in each box to make a true sentence.

$$\boxed{} + \boxed{} - \boxed{} = \boxed{}$$

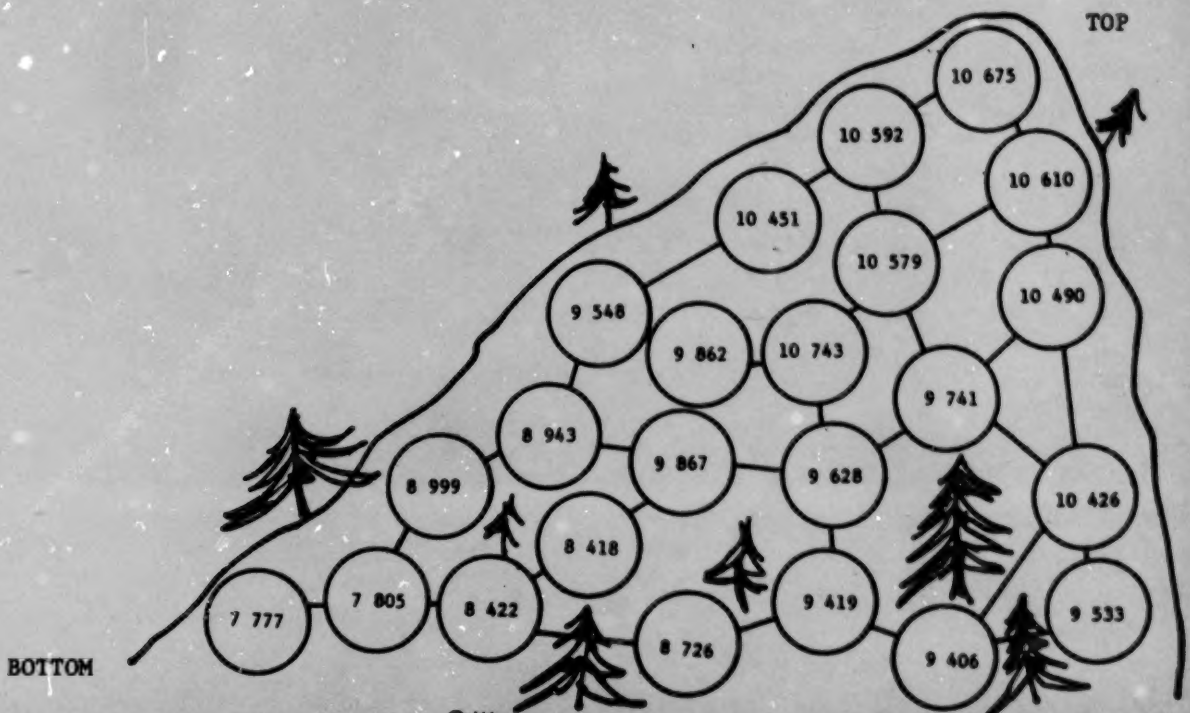
PROBLEM SOLVING SHEET 3.1GUESS AND CHECK

5. Which shapes can you cover exactly, using any number of pieces in the box. Each piece may be used more than once.



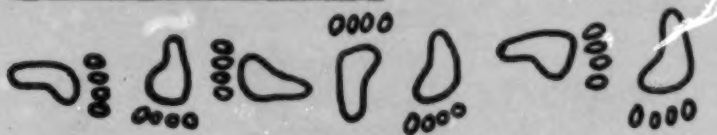
6. "It's all Downhill":

Start at the top of the mountain and ski down, moving only to a lesser or smaller number than the one you were on. Keep moving to smaller numbers until you reach the bottom. You can not move to a circle containing a larger number. Are there other ways one can ski down using the same rule?



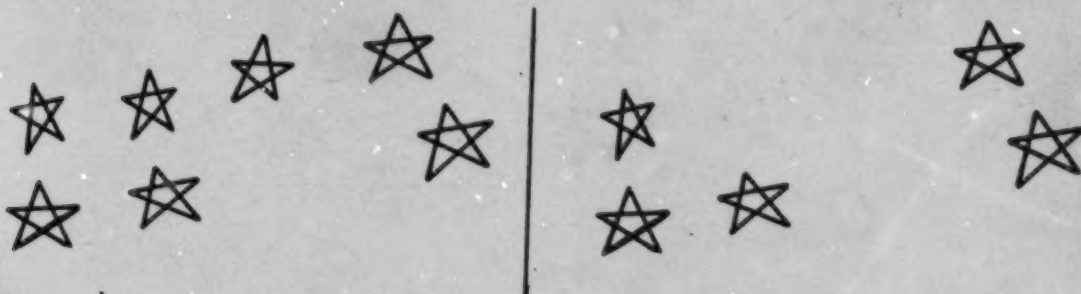
PROBLEM SOLVING SHEET 3.2LOOK FOR A PATTERN

- 1.
- Are you on the right track?



Follow the trail. What would the next three tracks look like?

- 2.
- Star Command:
- Complete the second constellation.

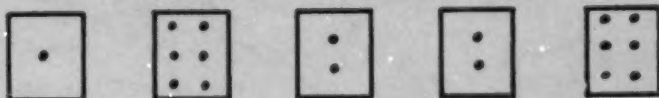


- 3.
- Do as the Romans did:
- Write in the missing Roman numerals.

II, IV, VI, VIII, _____.

XXX, XXIX, XXVIII, _____.

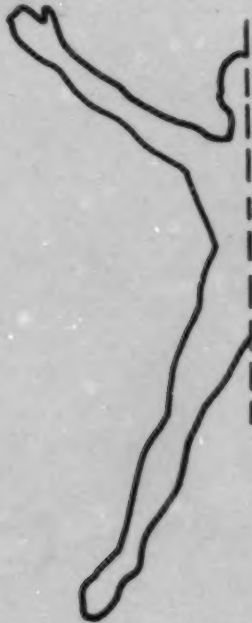
- 4.
- Break the Code:
- Match the words with the dot to make a sentence. Each dot represents one letter. Be careful as there is an extra word.



animal, is, sponge, an, a, played.

PROBLEM SOLVING SHEET 3.2LOOK FOR A PATTERN

5. The Human Body has symmetry. Complete the drawing.



Draw two objects that have symmetry and put in the line of symmetry for each.

6. What is a "Snuffie".

This is a Snuffie

This is not a Snuffie

. This is a Snuffie

. This is not a Snuffie

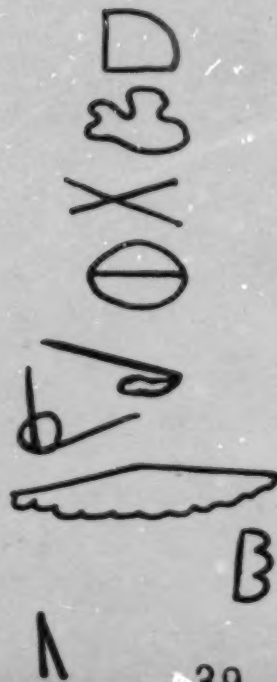
.. Is this a Snuffie?

2. Is this a Snuffie?

3. Is this a Snuffie?

4. Is this a Snuffie?

5. Is this a Snuffie?

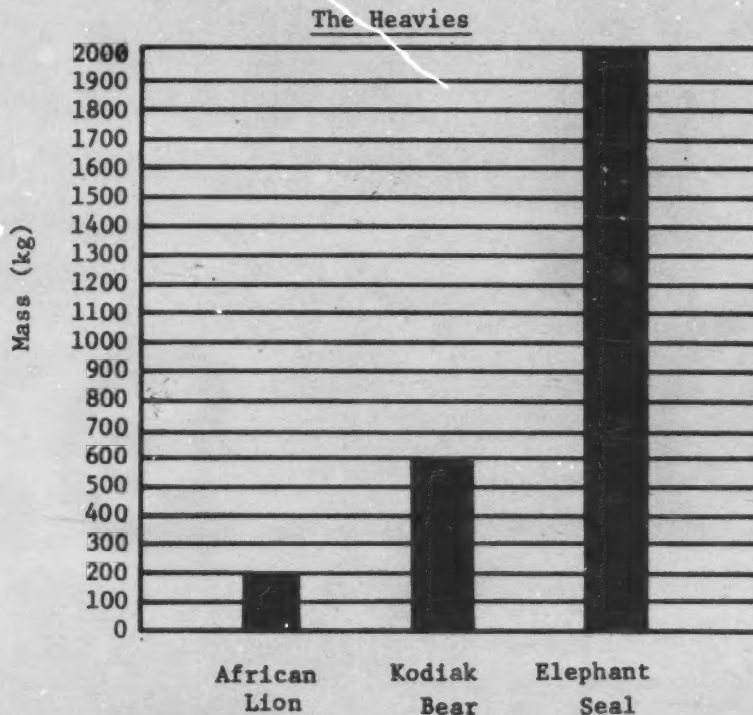


PROBLEM SOLVING SHEET 3.3ACT IT OUT

1. You have 8 coins totalling 65¢. What are the coins? In how many ways can you have 65¢ using 8 coins?
2. You have 11 fish in tank (A) and 5 in tank (B). Tank (A) has 9 guppies and 2 goldfish. Tank (B) has 1 guppy and 4 goldfish. In the fewest number of moves how can you get 5 guppies and 3 goldfish in each tank?
3. How many nickels high is a nickel standing on its edge?
4. In how many ways can you put 7 marbles into 2 cans so that there are marbles in each can? Make a list.
5. At a certain party there were 45 handshakes. Everyone shook hands with everyone else only once. How many people attended the party? (Hint: There were less than 15 people).
6. You buy a pig for \$200.00, sell it for \$220.00, buy it back again for \$240.00, and sell it for \$260.00. How much money have you gained or lost on the combined deals?

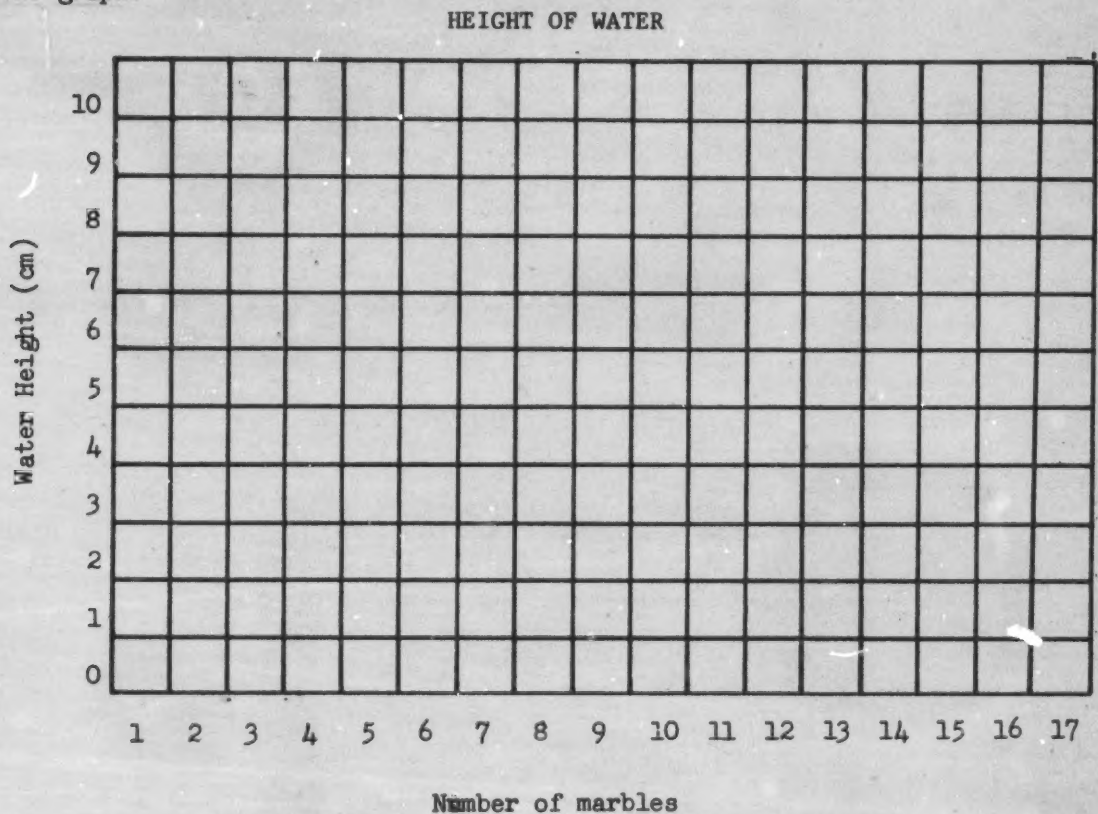
PROBLEM SOLVING SHEET 3.4DIAGRAM (DRAW/GRAPH)

1. How many beavers are there in the pond if there are 9 more legs than tails?
2. "Don't Get Licked" - You are in a line-up at "Dairy Queen". Six people are ahead of you in line. Four people are behind you. If two people leave their spots in line, how many people are still in line?
3. You have a long birch tree trunk that you are cutting into logs for your fire place. How many cuts do you have to make to cut 8 logs?
4. "Dining Dilemma" - There are 4 adults and 5 children at each table. There are a total of 20 children at dinner. How many tables are there? What is the total number of adults?
5. "The Heavies" -
The animal with the largest mass is _____.
It has a mass of _____ kg.



PROBLEM SOLVING SHEET 3.4DIAGRAM (DRAW/GRAPH)6. "Plot The Plop"

What happens to the height of water when one drops marbles into a jar of water? Take a jar filled with 5 cm of water and put in a marble. Measure the height of the water. Continue and plot your results on the graph.



PROBLEM SOLVING SHEET 3.5WRITE A NUMBER SENTENCE

1. If $\blacksquare$ = Add 10

$\square$ = Subtract 10

$\blacksquare$ = Add 1

$\square$ = Subtract 1

Then $\blacksquare \blacksquare \blacksquare \square \blacksquare \square \blacksquare$ = $\underline{\hspace{1cm}}$, if 0 is the starting point.

2. Use all these numbers (2,3,5,6) to make a true sentence. Make a list of all the possibilities.

$$\square \square \square \square$$

$$(\underline{\hspace{1cm}} + \underline{\hspace{1cm}}) - \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

3. List 5 ways you can make a sum of 20. Use only even numbers. Numbers may be repeated.

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

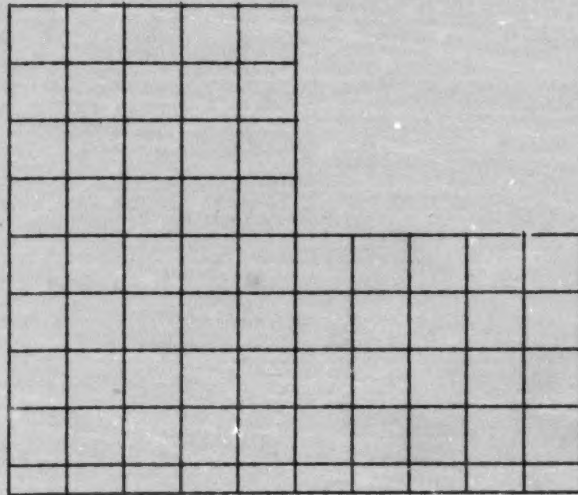
4. Diana has \$4.00. How much more money does she need to buy 3 tickets?

TICKETS \$1.50 Each

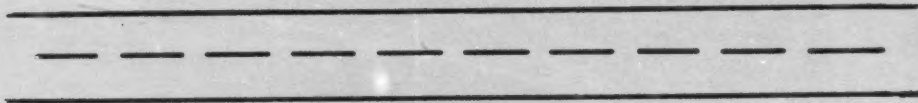
5. To go by bus from the suburb of East Kildonan to downtown Winnipeg takes 20 minutes. It takes another 20 minutes to go from downtown to the Polo Park Shopping Centre. How much time does it take to make a round trip from East Kildonan to Polo Park and back to East Kildonan?
6. How many minutes are there in a school day if it has $5\frac{1}{2}$ hours?

PROBLEM SOLVING SHEET 3.6MAKE A MODEL

5. Paul is getting in a new kitchen floor. How many whole tiles are needed to tile this floor? (REMEMBER: $\frac{1}{2}$ tile + $\frac{1}{2}$ tile = 1 tile)



6. This is 1 km of highway between Brandon and Dauphin. How many broken line markings are there altogether if the distance from Brandon to Dauphin is 167 km?



PROBLEM SOLVING SHEET 3.7MAKE A TABLE

1. If you wash 3 dishes in 1 minute how long will it take to wash 27 dishes?

Minutes	1	2	3	4	5	6	7	8	9	10
Dishes										

2. You have a nickel, a dime, and a quarter. How many ways can the money be spent using one or more coins each time?

5¢	10¢	25¢

3. How many different kinds of sundaes can you make if you have 3 kinds of ice cream (vanilla, chocolate, strawberry) and 3 kinds of toppings (caramel, marshmallow, chocolate)? You cannot make a sundae with strawberry ice cream and caramel topping. Don't forget to put a cherry on top. Name your combination on a table.

Different Kinds Of Sundaes

ice cream	marshmallow	caramel	chocolate
vanilla			
chocolate			
strawberry			



PROBLEM SOLVING SHEET 3.7

MAKE A TABLE

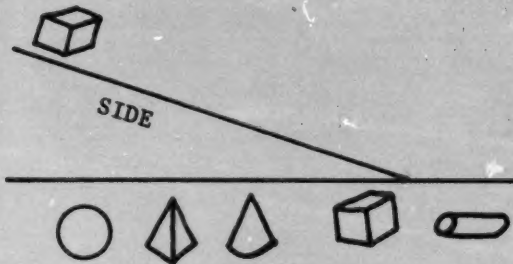
4. Tammy, Paul and Corey ordered different pizzas for lunch. They ordered a pepperoni, a ham and pineapple and a salami and mushroom pizza. From the information which follows find out who ordered what pizza. (use the table below).

1. Corey did not like combination pizzas.

2. Tammy did not like mushrooms.

	Pepperoni	Ham & Pineapple	Salami & Mushroom
Tammy			
Paul			
Corey			

5. Take the following 3 dimensional shapes. If it rolls, write yes - if it doesn't, write no. If it slides, write yes - if it doesn't, write no. Complete the chart.



	Rolls	Slides
sphere	yes	
pyramid		yes
cone		
cube		
cylinder		

6. Laura's goal is to score 30 points this season. If she scores 5 points every 3 games, how many games will she have to play to reach her goal of 30 points? Use the table below.

games	3	6							
points	5	10							

PROBLEM SOLVING SHEET 3.1ANSWERS AND SELECTED SOLUTIONS

1. 458

2. 4, 4, 4, or 5, 5, 2, or 4, 5, 3

3. D

4. $4 + 6 - 7 = 3$

$6 + 4 - 3 = 7$

Other solutions are possible

5. A and B

6. 10 675 - 10 592 - 10 579 - 9 741 - 9 628 - 9 419 - 8 726 - 8 422 -
7 805 - 7 777.

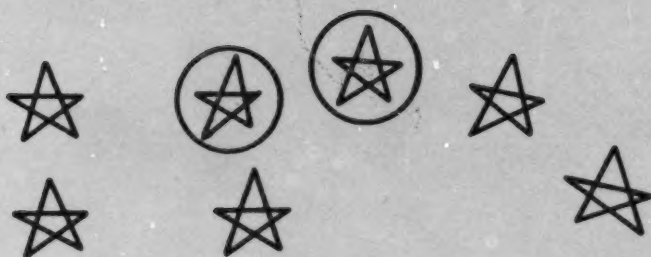
Yes, there are other ways.

PROBLEM SOLVING SHEET 3.2ANSWERS AND SELECTED SOLUTIONS

1.



2.

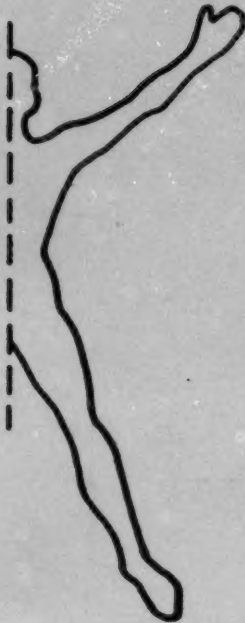


3. X, XII, XIV
XXVII, XXVI, XXV

4. A sponge is an animal.

PROBLEM SOLVING SHEET 3.2ANSWERS AND SELECTED SOLUTIONS

5.



6. 1. No
2. Yes
3. Yes
4. No
5. Yes

Answer: A Snuffie is a figure that contains an angle.

PROBLEM SOLVING SHEET 3.3

ANSWERS AND SELECTED SOLUTIONS

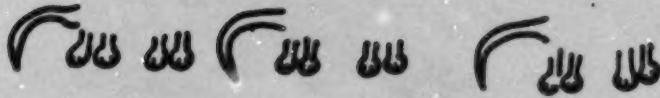
1. 1 quarter, 1 dime, 6 nickels
5 dimes, 3 nickels
Other ways are possible.

- | | | | | | | | | | | | | | | | | | | | |
|----|--|---|---|----|---|----|---|----|---|------------------|--|---|---|----|---|----|---|----|---|
| 4. | <table border="1"> <tr><td>A</td><td>B</td></tr> <tr><td>1,</td><td>6</td></tr> <tr><td>2,</td><td>5</td></tr> <tr><td>3,</td><td>4</td></tr> </table> | A | B | 1, | 6 | 2, | 5 | 3, | 4 | also the reverse | <table border="1"> <tr><td>A</td><td>B</td></tr> <tr><td>6,</td><td>1</td></tr> <tr><td>5,</td><td>2</td></tr> <tr><td>4,</td><td>3</td></tr> </table> | A | B | 6, | 1 | 5, | 2 | 4, | 3 |
| A | B | | | | | | | | | | | | | | | | | | |
| 1, | 6 | | | | | | | | | | | | | | | | | | |
| 2, | 5 | | | | | | | | | | | | | | | | | | |
| 3, | 4 | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | |
| 6, | 1 | | | | | | | | | | | | | | | | | | |
| 5, | 2 | | | | | | | | | | | | | | | | | | |
| 4, | 3 | | | | | | | | | | | | | | | | | | |

5. 10 people (Act it out with students)
6. Transaction 1. Buy for \$200.00 and sell for \$220.00. Gain of \$20.00
Transaction 2. Buy for \$240.00 and sell for \$260.00. Gain of \$20.00
Total gain of \$40.00

PROBLEM SOLVING SHEET 3.4ANSWERS AND SELECTED SOLUTIONS

1.



4 legs

1 tail

4 legs

1 tail

4 legs

1 tail

= 12 legs

= -3 tails

 9

Answer is: 3 beavers

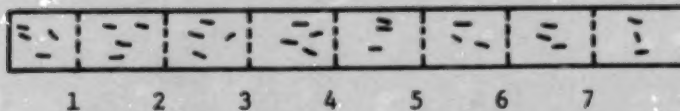
2.



Me

Answer is: $11 - 2 = 9$

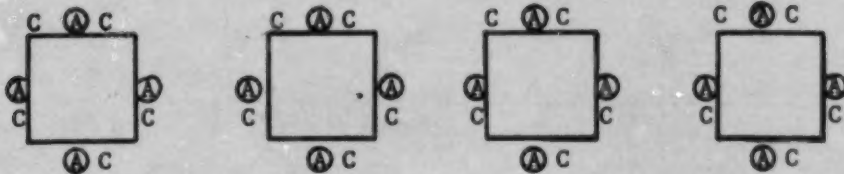
3.



1 2 3 4 5 6 7

Answer is: 7 cuts.

4.



There are 20 children and 4 tables.

Answer is: 16 adults.

5. Answer is: elephant seal

Mass is: 2000 kg

6. The water level will be raised. 52

PROBLEM SOLVING SHEET 3.5ANSWERS AND SELECTED SOLUTIONS

1. 21 if 0 is starting point.

2. $(3 + 5) - 2 = 6$

$(5 + 3) - 2 = 6$

$(5 + 3) - 6 = 2$

$(3 + 5) - 6 = 2$

$(6 + 2) - 5 = 3$

$(2 + 6) - 5 = 3$

$(6 + 2) - 3 = 5$

$(2 + 6) - 3 = 5$

3. $20 + 0 = 20$

$0 + 20 = 20$

$18 + 2 = 20$

$2 + 18 = 20$

$16 + 4 = 20$

$4 + 16 = 20$

$14 + 6 = 20$

$6 + 14 = 20$

$12 + 8 = 20$

$8 + 12 = 20$

$10 + 10 = 20$

4. $3 \times \$1.50 = \$4.50$

$\$4.50 - \$4.00 = \$0.50$

Answer is: 50¢

5. To Polo Park

Back

$(20 + 20)$

+

$(20 + 20) = 80 \text{ minutes or } 1 \text{ hour } 20 \text{ minutes}$

6. $(60 \times 5) + 30 = 330 \text{ minutes}$

Answer is: 330 minutes.

PROBLEM SOLVING SHEET 3.6ANSWERS AND SELECTED SOLUTIONS

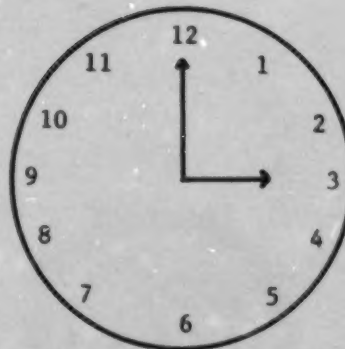
1.	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	Answer: October 14 was on Friday.				

2.

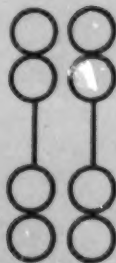
B.

Answer is: B

3. Count backwards 10 hours
Starting time is 5:00 a.m.

Answer is: 5:00 a.m.

4. Answer is: 3 axles

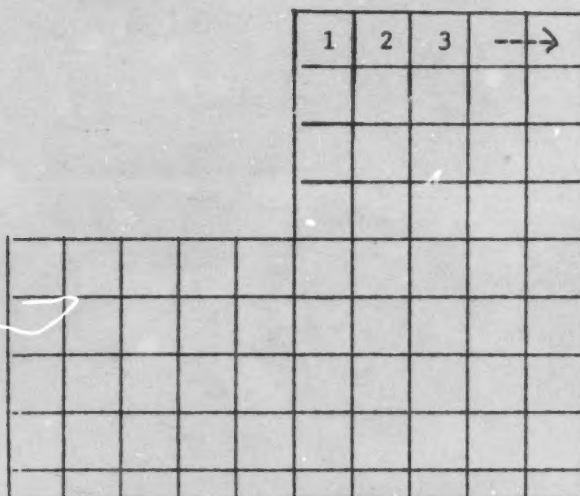


Front

54

PROBLEM SOLVING SHEET 3.6ANSWERS AND SELECTED SOLUTIONS

5.



10 halves require 5 tiles

60 tiles + 10 halves = 65 tiles

Answer is: 65 tiles.

6. There are 10 line markings for each km.

167 km between Brandon and Dauphin will have

$$\begin{array}{r} 167 \\ \times 10 \\ \hline \end{array}$$

1670 line markings

Answer is: 1670 markings.

PROBLEM SOLVING SHEET 3.7ANSWERS AND SELECTED SOLUTIONS

1.

Minutes	1	2	3	4	5	6	7	8	9	10
Dishes	3	6	9	12	15	18	21	24	27	30

Answer is: 9 minutes

2.

5¢	10¢	25¢	
x			5¢
	x		10¢
		x	25¢
x	x		15¢
x		x	30¢
	x	x	35¢
x	x	x	40¢

3.

ice cream	marshmallow	caramel	chocolate
vanilla	x	x	x
chocolate	x	x	x
strawberry	x		x

Answer is: 8 sundaes

PROBLEM SOLVING SHEET 3.7ANSWERS AND SELECTED SOLUTIONS

4.

	Pepperoni	Ham & Pineapple	Salami & Mushroom
Tammy		X	
Paul			X
Corey	X		

5.

	Rolls	Slides
sphere	yes	no
pyramid	no	yes
cone	yes	yes
cube	no	yes
cylinder	yes	yes

6.

games	3	6	9	12	15	18
points	5	10	15	20	25	30

Answer is: 18 games

ASSORTED PROBLEMS

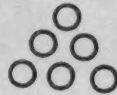
GRADE 3

ASSORTED PROBLEMS

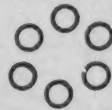
1. Fill in the blanks in the table with the right number of goals, (G) assists, (A) or points (P).

<u>Leading Scorers</u>			Total
	G	A	P
W. Gretzky, Edm.		120	212
M. Bossy, NYI	<u>64</u>	83	147
P. Stastny, Que.	46	93	139
D. Maruk, Wash.	60	76	136
B. Trottier, NYI	50	79	129
D. Savard, Chi.	32	87	119
M. Dionne, L.A.	50		117
B. Smith, Mont.	43	<u>71</u>	114
D. Ciccarelli, Minn.	55	51	106
D. Taylor, L.A.	39	67	106
G. Anderson, Edm.	38	67	105
D. Hawerchuk, Wpg.	45	58	
M. Rogers, NYR	38	65	<u>103</u>
N. Broten, Minn.	38	60	98
R. Cloutier, B.S.	37	60	97

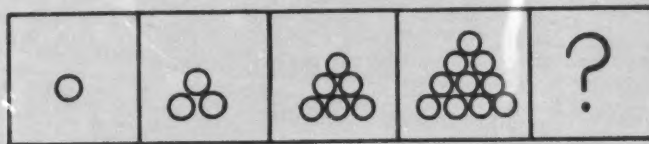
2. Six objects are set out in a triangular shape



Using only 2 sliding moves form a circular shape as shown below.

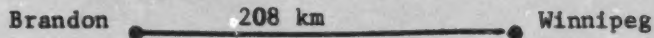


3. Hunger Pangs! How many slices of bread are needed to make a "clubhouse" sandwich using ham, cheese and tomato? A slice of bread must be placed between each filling.
4. More Marbles! How many marbles will there be in the fifth space?

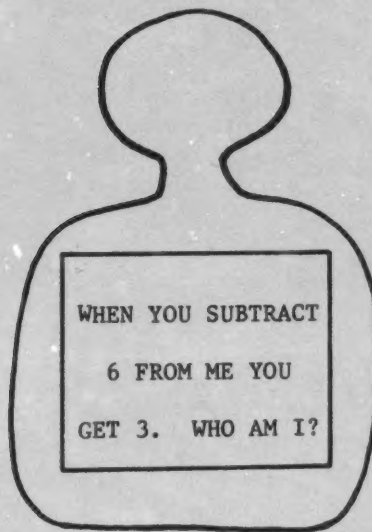


ASSORTED PROBLEMS

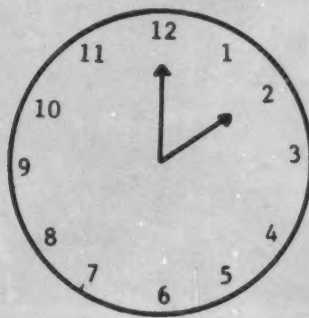
5. Jim cycled from Brandon to Winnipeg and was on his way back to Brandon. If he has already cycled 299 km, how many more km must he cycle to get back to Brandon?



6.

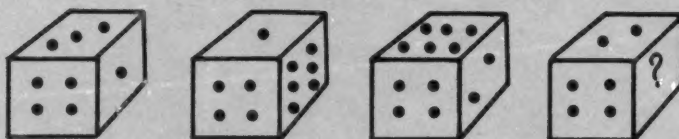


7. It is now 2:00 o'clock. Draw the hands on the clock as they would have appeared 5 hours earlier.



ASSORTED PROBLEMS

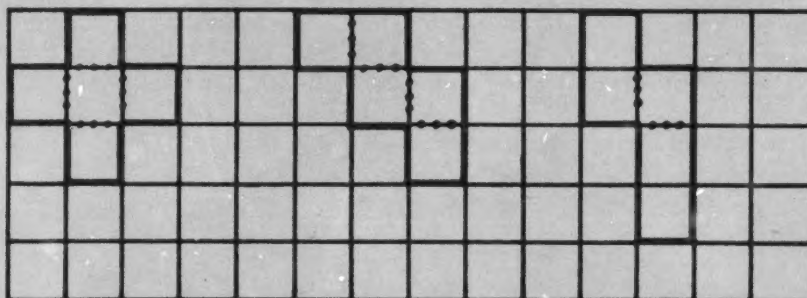
8. How many dots are there on the open face of the fourth die?



9. Two girls are each less than 9 years old. They are not the same age. The sum of their ages is 14 years. One girl is older than 6. How old are the two girls?
10. How many pages from 1 - 100 have a numeral 2 in the number.
11. To complete each subtraction problem, use the digits 4, 7 and 9 once.

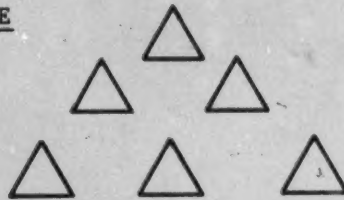
$$\begin{array}{r} \square \square \\ - \square \\ \hline 6 \quad 5 \end{array} \quad \begin{array}{r} \square \square \\ - \square \\ \hline 9 \quad 3 \end{array} \quad \begin{array}{r} \square \square \\ - \square \\ \hline 3 \quad 8 \end{array}$$

12. Each of the patterns below can be folded to make an open box. In each pattern color the square that will be on the bottom of the box.



ASSORTED PROBLEMS

13. A carton of soft drinks, including deposit, costs \$3.00. If the deposit is \$1.00, how many times more is the cost of drinks?
14. How many toothpicks are needed to make 4 triangles? How many tooth picks are needed if the sides are shared?
15. MAGIC TRIANGLE



Try These!: In each of the small triangles, place the numbers 1 to 6 to make the sum the same along each side of the large triangle.

16. Papa bear weighs 389 kg, mama bear weighs 253 kg. If baby bear weighs 56 kg, how much more does papa bear weigh than mama and baby bear together?
17. According to temperatures recorded by Environment Canada:
- Which place in Canada has the lowest maximum temperature?
 - Which place in Canada has the lowest minimum temperature?

<u>NATIONAL</u>	<u>MAX.</u>	<u>MIN.</u>
Victoria	16	10
Vancouver	17	10
Calgary	23	4
Edmonton	23	5
Regina	21	0
Winnipeg	15	3
Thompson	9	-3
Kenora	11	4
Brandon	18	0
Dauphin	17	1
Thunder Bay	12	-1
Toronto	16	10
Ottawa	20	8
Montreal	20	9
Halifax	17	9

ASSORTED PROBLEMS

18. Find the sum of the digits in this telephone number: 284-3145
Write other telephone numbers with the same sum. You may use other numbers if you wish. See how many telephone numbers you can get.
19. Donna has twice as many coins as Cathy. When Donna gives Cathy 2 coins, they each have the same number. How many coins do they each have?
20. What is the fewest number of chips required to call bingo in any direction?

B	I	N	G	O
		Free Space		

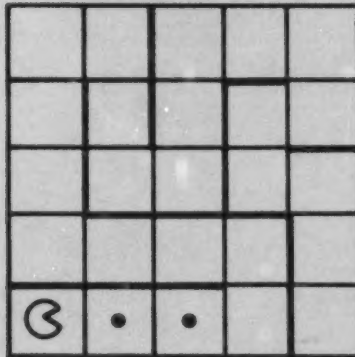
21. A man leaves home and makes three left turns and then runs into two masked men. Who is the man? Hint: Draw a diagram.
22. Find the average number of yards on a fumble return for each of the following football players: Norman and Priestner. (Hint: An average is found by the dividing number of yards returned (YDS.) by the number of fumbles (NO.).

FUMBLE RETURNS

	NO.	YDS.
Norman, Winnipeg	4	24
Corrigal, Toronto	3	33
Priestner, Hamilton	3	12
Prassas, Calgary	3	0
Catan, Winnipeg	3	0
Hollimon, Edmonton	2	59
Phason, Winnipeg	2	23
Hosea, Saskatchewan	2	22
Towns, Edmonton	2	21

ASSORTED PROBLEMS

23. Pac-man eats one dot in each square centimetre (cm^2) of space he travels. If he travels around the outside of the screen which is 5 cm x 5 cm, how many dots will he eat?



24. "What's in a name?"

If: A	B	C	D	E	F	G	H	I	J	K	L	M
1¢	2¢	3¢	4¢	5¢	1¢	2¢	3¢	4¢	5¢	1¢	2¢	3¢
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
4¢	5¢	1¢	2¢	3¢	4¢	5¢	1¢	2¢	3¢	4¢	5¢	1¢

then,

- Find the value of your name
 - Find the value of a friend's name.
25. Dave's kite is flying 90 m above the ground. Randy's kite is flying 50 m above the ground. If Kevin's kite is halfway between the two, how high is it above the ground?
26. Can you place the letters A, B and C in the chart below so that no letter appears twice in any row and column?

ASSORTED PROBLEMS

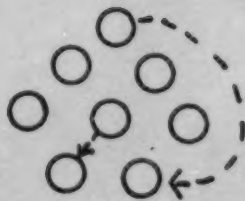
27. How many days old are you today?
28. A quarter weighs 6 g. A penny weighs 3 g. How many pennies will weigh the same as 10 quarters?
29. I am the smallest 4 digit number with all digits being even and different. 0 is even but I have no zero. Who am I?
- I am the largest 3 digit number with all digits being odd and different. Who am I?
30. Dave, Gord, and Janet went fishing. They caught 4 northern pike, 3 walleye, and 1 lake trout. From the information which follows find out who caught which fish if:
1. Dave caught 2 fish - one a northern pike and one a lake trout.
 2. Janet caught twice as many of each fish as Gord.

	Northern Pike	Walleye	Lake Trout
Dave			
Gord			
Janet			

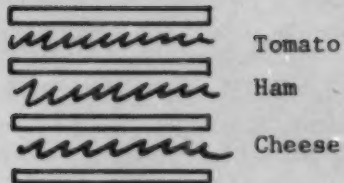
ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

	G	A	P
1. W. Gretzky	92		
M. Dionne		67	
D. Hawerchuk			103

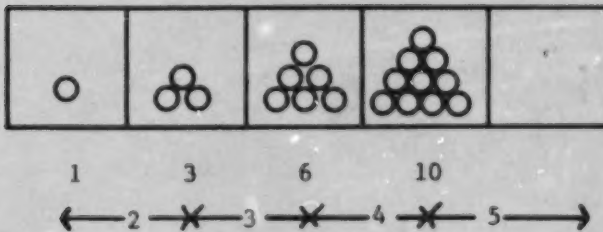
2.



3.

Answer is: 4 slices of bread

4.

Answer is: $10 + 5 = 15$ marbles.

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

5. $(208 + 208) - 299$

$416 - 299$

$= 117$

Answer is: 117 km

$208 - (299 - 208)$

$208 - 91$

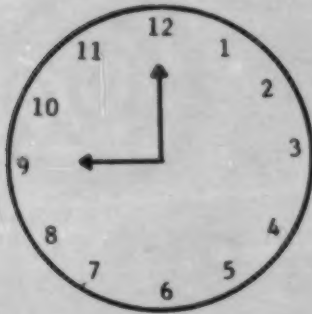
$= 117$

OR

6. $\square - 6 = 3$

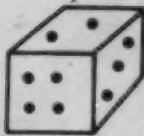
Answer is: 9

7.



Answer is: 9:00 o'clock

8.

Answer is: 3 dots

9. Answer is: 6 and 8 years old.

10. 2, 12, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 32, 42, 52, 62, 72, 82, 92

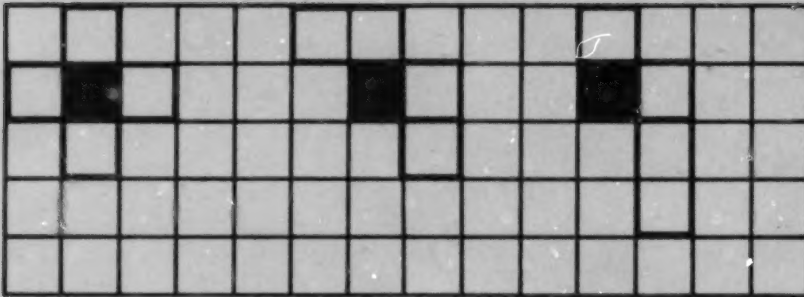
Answer is: 19 pages

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

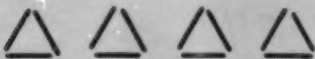
11.

7	4	9	7	4	7
-	9	-	4	-	9
6 5		9 3		3 8	

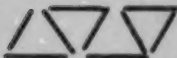
12.

13. Cost of drinks is $\$3.00 - \$1.00 = \$2.00$ $\$2.00$ is 2 times more than $\$1.00$ Answer is: 2 times more

14.



- 12 toothpicks



- 9 toothpicks

15.



68

Other solutions are possible.

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

16.
$$\begin{array}{r} 253 \\ +56 \\ \hline 309 \text{ kg} \end{array} \qquad \begin{array}{r} 389 \\ -309 \\ \hline 80 \text{ kg} \end{array}$$

Answer is: 80 kg

17. Thompson has the lowest maximum temperature of 9°C .
Dauphin has a minimum temperature of 1°C .

18. Sum is: 27

Any number of solutions are possible, including rearranging the digits in the given telephone number or using other numbers.

- 19.

	Trial 1		Trial 2		Trial 3	
	No. of coins	No. of coins after giving 2	No. of coins	No. of coins after giving 2	No. of coins	No. of coins after giving 2
Donna	4	2	6	4	8	6
Cathy	2	4	3	5	4	6

Have children use pennies and act it out using guess and check.

Donna has 8 coins

Cathy has 4 coins

- 20.

B	I	N	G	O
		Free Space		

Answer is: 4 bingo chips

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

21.

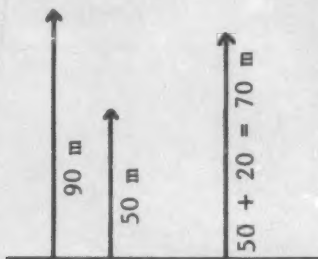
Answer is: Baseball player

22. Norman, Winnipeg - $24 \div 4 = 6$ yd
 Priestner, Hamilton - $12 \div 3 = 4$ yd

23. Answer is: 16 dots

24. Answers will vary

25. $90 - 50 = 40$ m
 $40 \div 2 = 20$ m
 $50 + 20 = 70$ m or $90 - 20 = 70$ m

Answer is: $50 + 20 = 70$ m above the ground.

26.

B	C	A
C	A	B
A	B	C

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

27. No. days old is:

$$365 \times \text{age} = \underline{\hspace{2cm}}$$

$$\text{No. of days since your birthday} = \underline{\hspace{2cm}}$$

$$\text{Total No. of days old is} + \underline{\hspace{2cm}}$$

Answer will vary.

28. $10 \times 6 = 60$ grams

$$60 \div 3 = 20 \text{ pennies}$$

Answer is 20 pennies

29. Answers are:

2 4 6 8

9 7 5

30.

	Northern Pike	Walleye	Lake Trout
Dave	1		1
Gord	1	1	
Janet	2	2	

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

27. No. days old is:

$$365 \times \text{age} = \underline{\hspace{2cm}}$$

$$\text{No. of days since your birthday} = \underline{\hspace{2cm}}$$

$$\text{Total No. of days old is} + \underline{\hspace{2cm}}$$

Answer will vary.

28. $10 \times 6 = 60$ grams

$$60 \div 3 = 20 \text{ pennies}$$

Answer is 20 pennies

29. Answers are:

$$\underline{2} \quad \underline{4} \quad \underline{6} \quad \underline{8}$$

$$\underline{9} \quad \underline{7} \quad \underline{5}$$

30.

	Northern Pike	Walleye	Lake Trout
Dave	1		1
Gord	1	1	
Janet	2	2	

PROBLEM SOLVING SHEETS

GRADE 4

50

CURRICULUM CHART: GRADE 4

CURRICULUM TOPICS										STRATEGIES								
PROBLEM SHEETS	Counting	Place Value	Whole Number Operations and Estimation and Rounding Off	Patterns	Fractions	Decimals	Graphing	Measurement	Geometry	Guess and Check	Look for a Pattern	Act It Out	Diagram (Draw/Graph)	Write a Number Sentence	Make a Model	Make a Table	Work Backwards	Account for All Possibilities
4.1		o	o	o				o		x	v	v	v	v	v			
4.2	o	o	o	o					o	v	x		v		v			
4.3				o				o		v		x	v		v			
4.4		o	o				o	o			v		x		v			
4.5		o	o	o						v	v			x		v		
4.6	o		o	o	o	o		o	o		v	v	v		x		v	v
4.7		o	o	o												x		
4.8	o	o	o	o						v	v		v	v		v	x	
4.9	o	o	o	o				o		v		v		v	v			x

o - curriculum topic
 x - key strategy
 v - alternative strategies

30 Assorted Problems

PROBLEM SOLVING SHEET 4.1GUESS AND CHECK

1. Mary has 6 coins which have a total value of 67¢. What combinations of coins could she have?
2. Using 3, 4, 5, and 6 only once, write the sentence.

$$\square \times \square + \triangle - \bigcirc = 17$$

3. Take away 1 stick so that there are exactly 7 small squares remaining.

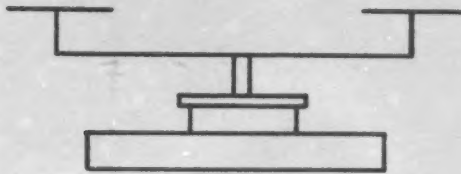
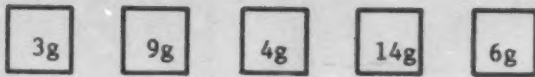


4. Navigate your spaceship to the "Black Hole". The product of the numbers along your path must be 2592.

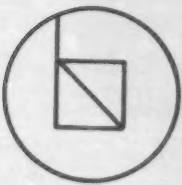
START

PROBLEM SOLVING SHEET 4.1GUESS AND CHECK

5. Put all the weights on the scale so that the scale balances.



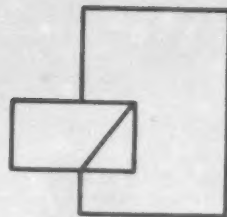
6. Which of these figures can be drawn without taking a pencil off the page? Do not retrace the lines.



A



B



C

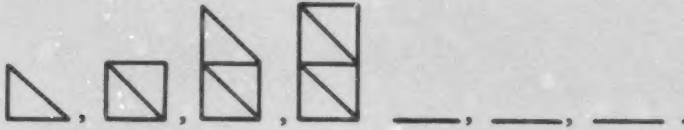
PROBLEM SOLVING SHEET 4.2LOOK FOR A PATTERN

1. Complete the following patterns:

1, 3, 5, 7, __, __, __.

2, 4, 6, 8, __, __, __.

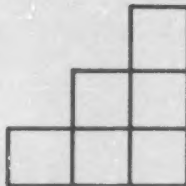
2. Complete the pattern:



3. How many of these o's will there be in each of the next 3 spaces?

o, oooo, oooooooooo, oooooooooooooooooo, _____, _____, _____.

4. If six cubes are needed to make 3 steps, how many cubes are needed to make 6 steps?



5. Look for the pattern. Continue with the pattern until 54 is reached.

$$2 + 4 + 6 = 12$$

$$4 + 6 + 8 = 18$$

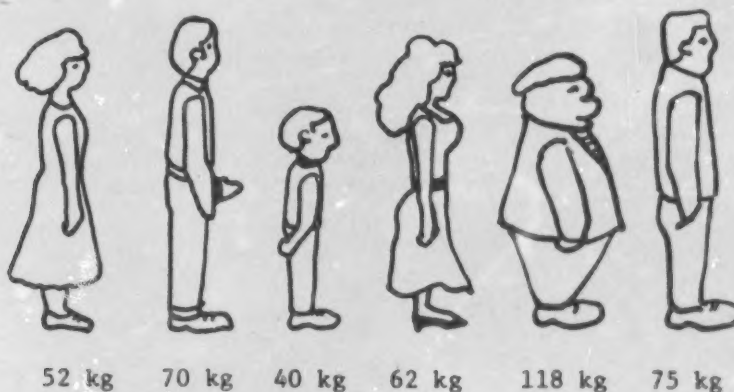
$$6 + 8 + 10 = 24$$

$$8 + 10 + 12 = 30$$

6. A box contains more than 15 but fewer than 35 hockey pucks. When the pucks are counted by 3's, there are 2 left over. When the pucks are counted by 5's there is 1 puck left over. How many hockey pucks are in the box?

PROBLEM SOLVING SHEET 4.3ACT IT OUT

1. Mr. Smith was standing in line at the ticket counter. There were 8 people behind him and 3 people in front of him. How many people were standing in line?
2. Paul has a 12 litre jug and a 5 litre jug. Both containers are unmarked. If exactly 8 litres of water are needed, how can it be obtained using the two jugs?
3. Ten Penny Pick-up
Use 10 pennies and try this game with a friend. At your turn pick up one, two, or three pennies. Then have the friend do the same, that is pick up one, two, or three pennies. Whoever picks up the last penny loses. How can a plan be worked out so that the person who goes first always wins?
4. The following people need to get to the top of the mountain. A gondola holds a maximum of 4 people at one time. The gondola carries a maximum load of 230 kg.



If the two ladies must ride together, make a list of all the different possibilities. What are the fewest number of trips necessary to get everyone to the top of the mountain?

PROBLEM SOLVING SHEET 4.3ACT IT OUT

5. Representatives from the Jets, Leafs, Canadiens, Flames, Oilers and Canucks were all staying in the same hotel. There was a taxi-cab strike and all of them needed to get to the National Hockey League meetings. Also, no public transportation was available to the meeting.

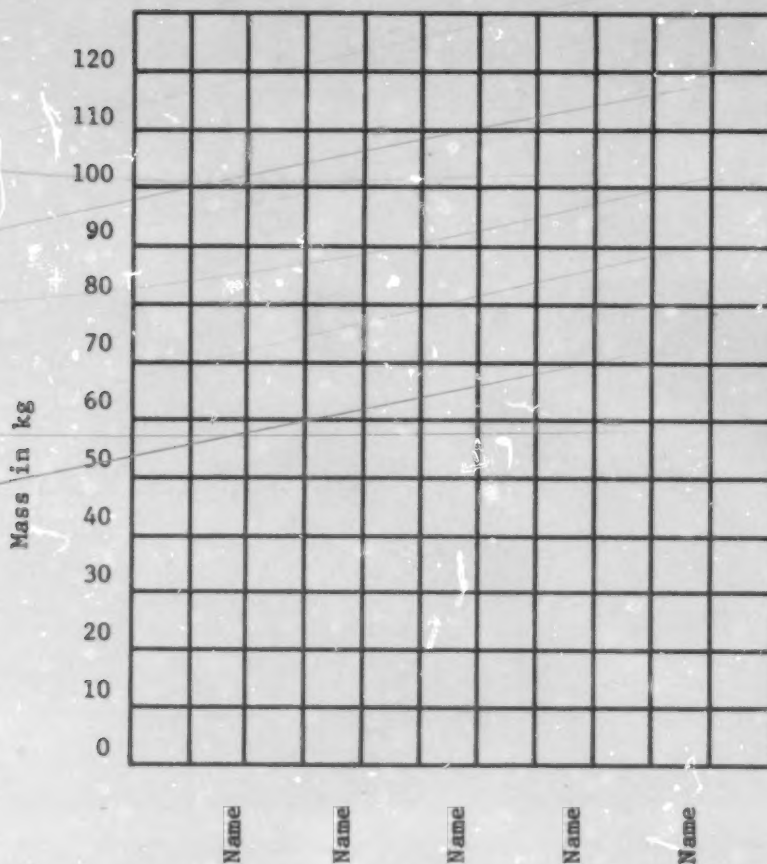
The manager of the hotel kindly loaned his car to them but it was only a 3 passenger car. The representative from the Flames could not drive. The representative from the Jets and Oilers always wanted to be together so as not to let the other players trade with the Canuck representative. The Leaf representative was running the meeting so he needed to go with the first trip. How can all of them get to the meeting and at the same time satisfy their needs?

6. 3 fishermen and their guides started out together on a fishing trip. They planned to split up later. However they needed to get from the shore to an island which was 3 km away. There was a boat at the shore which would hold only 2 people at a time. Each fisherman thought his guide was the best of the three, so he did not want his guide near any other fisherman unless he himself was also present. It was the beginning of the fishing season and the water was much too cold for swimming.

How can all six people get to the island safely, satisfying the fisherman guide requirement?

PROBLEM SOLVING SHEET 4.4DIAGRAM (DRAW/GRAPH)

1. How many elephants are there in the circus ring if there are 10 more legs than trunks and tails combined.
2. A fence is 18 metres long. The fence posts are 3 metres apart. How many posts are there in the fence?
3. Measure the mass of 3 of your friends. Plot the weights in kg.

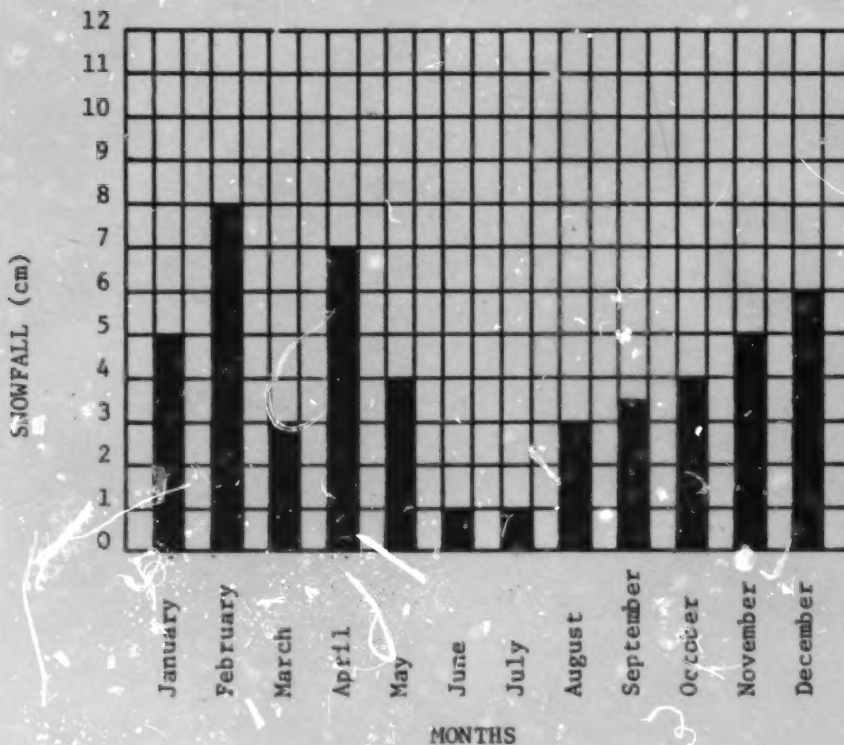
MASS OF MY FRIENDS

PROBLEM SOLVING SHEET 4.4

DIAGRAM (DRAW/GRAPH)

4. How much more snow falls in The Pas in February than in December?

MONTHLY SNOWFALL IN THE PAS



5. Trace your hand onto centimetre paper. Estimate the area of your hand. Then count the squares (part of squares too) inside your handprint. What is the area of your hand in square cm?
6. Have each of the students in your classroom count the number of chips in his/her chocolate chip cookie. Record the results, then plot them on a graph. What is the most frequent number of chips found in the cookies?

PROBLEM SOLVING SHEET 4.5WRITE A NUMBER SENTENCE

1. Pick two of these numbers at a time and add them. Which pairs of numbers add to a number greater than 20? 14, 9, 11, 10, 12.

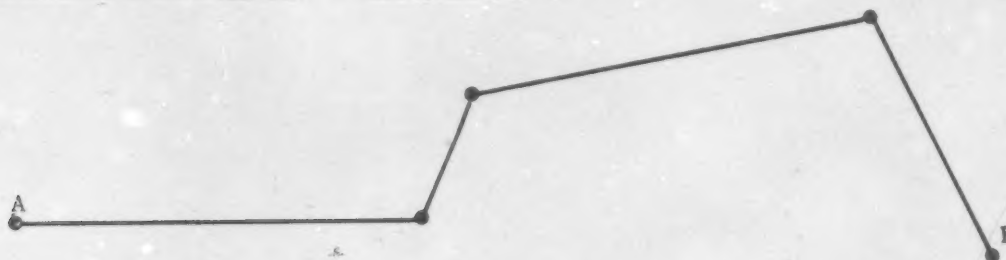
2. If $\triangleup$ = Add 5
 $\rightarrow$ = Add 1

∇ = Subtract 5
 $\leftarrow$ = Subtract 1

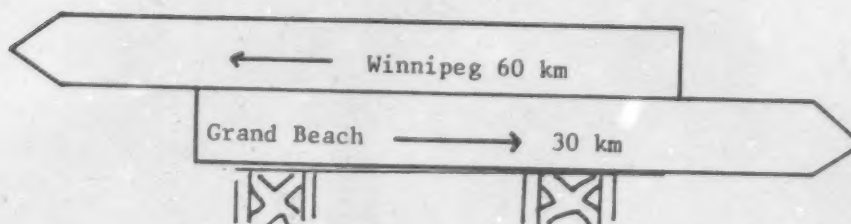
Then 0 $\triangleup$ $\triangleup$ $\triangleup$ $\leftarrow$ ∇ = ?

and 0 $\triangleup$ $\triangleup$ $\triangleup$ $\triangleup$ $\leftarrow$ = ?

3. Suppose a crab crawls at a speed of 2 cm each minute. The crab needs to rest at each dot for 5 minutes. How many minutes will it take the crab to go from A to B?



4. When you are 10 km from Grand Beach, how far are you from Winnipeg?



PROBLEM SOLVING SHEET 4.5WRITE A NUMBER SENTENCE

5. The trip from Winnipeg to Berens River is 260 km. Some of the travel is by car and some is by boat (Lord Selkirk). How many km do you travel by boat if the distance from Winnipeg to Selkirk is 35 km?

Hint: Assume Lord Selkirk will not fit through the locks at Lockport.

6. What is the score?

The sum of the scores is 19.

The difference is 9.

The product is 70.

The Winnipeg Blue Bombers won.

Winnipeg Blue Bombers



Calgary Stampeders



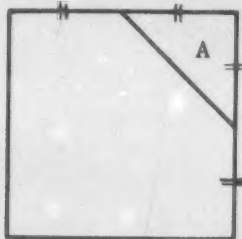
PROBLEM SOLVING SHEET 4.6MAKE A MODEL

1. The Brandon Sun, (a daily paper), costs \$0.20. A Saturday paper costs \$0.25. What is the total cost for the newspaper for the first 12 days of May?

MAY

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

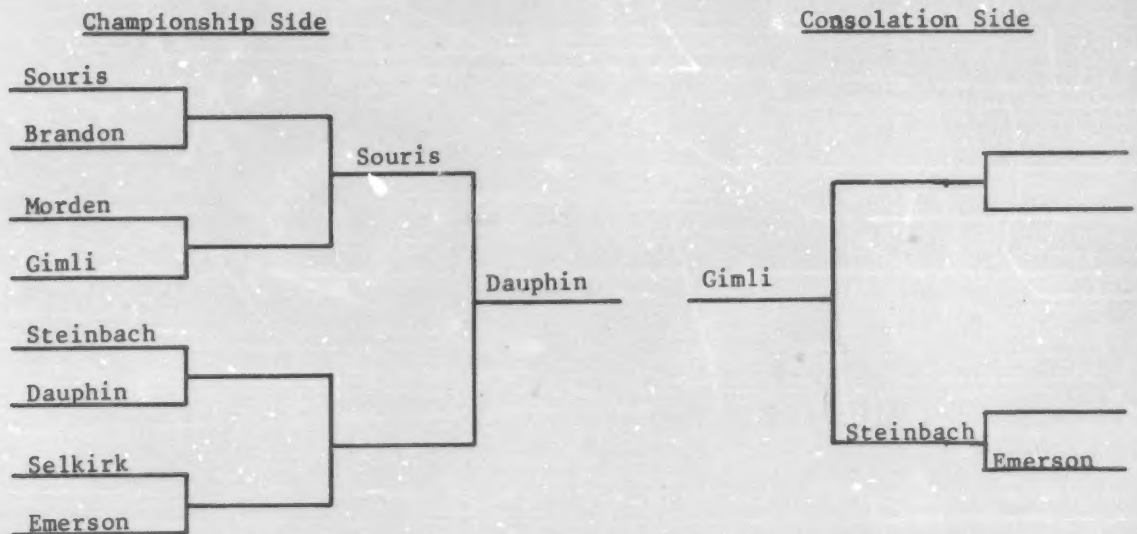
2. Triangle A costs 10¢. What does the large square cost?



3. A painter stood at the top of the ladder when painting the eaves trough. He then decided to paint the window trim so he went down 5 rungs. Now he was half way down the ladder. How many rungs did the ladder have?

PROBLEM SOLVING SHEET 4.6MAKE A MODEL

4. Small cars are 3 metres long.
Large cars are 4 metres long.
A large driveway is 20 metres in length and parked cars must be 1 metre apart.
How many small cars can be parked?
How many large cars can be parked?
5. Suzanne is planning her garden. She will use the outer $\frac{1}{2}$ m of the garden to plant flowers. How many rows of vegetables can she grow if the rows are 1 m apart.
6. Here is a schedule from a hockey tournament. Fill in the tournament draw.



PROBLEM SOLVING SHEET 4.7MAKE A TABLE

- Glen is preparing to run in the Manitoba Marathon. He must be able to run 42 km. Glen is able to run 10 km now. Each week he increases his distance by 4 km. How many weeks must he train in order to be ready for the Marathon? (Hint: Make a Table)
- How many ways can you use nickels, dimes, and quarters to make 30¢? Complete the table below.

NICKELS	DIMS	QUARTERS
XXXXXX		
XXXX	X	

- Sandy, Brian, Jennifer and Danny were playing baseball, tennis, hockey and golf. From the information which follows find out what game each person was playing.
 - Danny and Sandy do not like team sports.
 - Jennifer hit a home run.
 - Sandy broke her racquet.

	Baseball	Tennis	Hockey	Golf
Sandy				
Brian				
Jennifer				
Danny				

PROBLEM SOLVING SHEET 4.7

MAKE A TABLE

4. Complete the following chart to find out how many rectangles there are in the figures.



Squares In A Row						
	1	2	3	4	5	6
rectangle	1	3				

5. Find the average return on an interception for the following players:
Jones, Edmonton and Kepley, Edmonton

INTERCEPTION RETURNS

	NO.	YDS.	L	TD	
Crawford, B.C.	8	133	60	1	L - Longest Return
Pierson, Wpg	7	107	38	1	TD - Touchdown
Highbaugh, Edm	7	28	29	0	
Jones, Edm	7	28	11	0	Jones, Edmonton
Hinton, B.B.	6	119	44	1	and
Phason, Wpg	6	98	37	0	Kepley, Edmonton
Woods, Ham	6	97	23	0	
Kepley, Edm	6	84	30	0	
Dennis, Sask	6	58	35	0	
Irvin, Cal	6	29	13	0	
Sutton, Ott	5	109	86	0	
Ingram, Cal	5	96	56	0	
Paul, Ham	5	58	32	0	
Ezerins, Wpg	5	57	27	0	

6. If a goal scored is counted as a shot on goal in the summary, how many saves did Palmateer make?

VANCOUVER 4 AT TORONTO 6

First Period

1. Toronto, Boudreau 5 (Turnbull) 2:13.
 2. Vancouver, Ververgaert 7 (Lever) 4:18.
 3. Toronto, Sittler 21 (Salming, Turnbull) 9:30.
 4. Vancouver, Graves 8 (Griedale) 12:45.
 5. Toronto, Thompson (Boudreau) 13:00.
 6. Vancouver, Blight 11 (Martin) 15:50.
- Penalties—Martin Vcr 8:56, Williams Tor 9:43, Lever Vcr 11:17, Turnbull Tor 17:30.

Second Period

7. Vancouver, Martin 7 (Griedale, Salming) 11:22.
- Penalties—None.

Third Period

8. Toronto, McDonald 23 (Sittler) 0:45.
 9. Toronto, Williams 12 (Sittler, Salming) 15:34.
 10. Toronto, Ferguson 4 (Boutette, Turnbull) 16:13.
- Penalties—Goodenough Vcr 17:20.
- Shots on goal:**
- | | | | |
|-----------|----|----|-------|
| Vancouver | 14 | 10 | 6—30 |
| Toronto | 21 | 13 | 23—57 |
- Goal—Maniago, Vancouver;
Palmateer, Toronto.
- Attendance—16 465.

PROBLEM SOLVING SHEET 4.8WORK BACKWARDS

1. Robert leaves Flin Flon and arrives in Thompson at 12 00 h. He then finds out he has a meeting in Grand Rapids at 17 00 h. What time did he leave Flin Flon? What time will he get back to Thompson if the meeting ends at 20 00 h?

From Flin Flon to Thompson is 387 km and it takes 5 hours to travel.

From Thompson to Grand Rapids is 329 km and it takes 4 hours to travel.

2. The time is now 16 00 h. If you had lunch at 12 00 h, and you ate breakfast four hours before lunch, what time did you eat breakfast?
3. Rabbits multiply at an amazing rate. In year 1 there are X rabbits. The rabbit population doubles each year. The forest is crowded in year 7 when there are 3 200 rabbits. How many rabbits were there in year one if the population doubles each year?

4. Cindy is looking for the correct cloud.



If she adds 7 to a cloud and then subtracts 2, she gets an answer of 8, that is $\boxed{?} + 7 - 2 = 8$. What number is in the cloud?

5. There are the same number of pencil crayons in each box. How many pencil crayons are there in each box?



6. If $\boxed{?} + \boxed{2} \times \boxed{10} - \boxed{5} = \boxed{45}$

What is the value of $\boxed{?}$?

PROBLEM SOLVING SHEET 4.9ACCOUNT FOR ALL POSSIBILITIES

1. Rose would like change for her dollar. Using 7 coins at one time, list two possible solutions.

2. Shirley was waiting for a bus and saw 32 wheels go by. How many car(s) and bus(es) went by? List all the possibilities.

Car has 4 wheels.

Bus has 6 wheels.

3. Using only 2 numbers which are even, how many different ways can one get the answer 20? Example $18 + 2 = 20$

4. During a science class, John counted 32 legs when he saw some spiders and flies. How many flies did he see? How many spiders did he see? List all possible solutions.

Spiders have 8 legs.

Flies have 4 legs.

5. Using the menu, make a list of the possible different dinners that can be ordered.

MENU

(choose one) MAIN COURSE

- Pork Chops
Steak
Meat Loaf

(choose one) VEGETABLES

- Beans, Carrots, Corn

PROBLEM SOLVING SHEET 4.9ACCOUNT FOR ALL POSSIBILITIES

6. What is the shortest way from town A to town B in km?

Hint: Use string and a cm ruler.

Scale: 1 cm = 1 km



Town A



Town B

PROBLEM SOLVING SHEET 4.1ANSWERS AND SELECTED SOLUTIONS

1. 2 - 25¢ (There are other solutions)

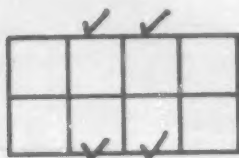
1 - 10¢

1 - 5¢

2 - 1¢

2. $3 \times 5 + 6 - 4 = 17$

3. Anyone of the four (✓) sticks can be removed.



4. START



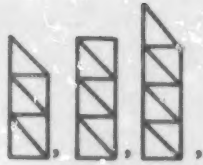
5. $(3g + 9g + 6g)$ and $(14g + 4g)$ OR $(14g + 4g)$ and $(3g + 9g + 6g)$

6. Answers are: A and C

PROBLEM SOLVING SHEET 4.2ANSWERS AND SELECTED SOLUTIONS

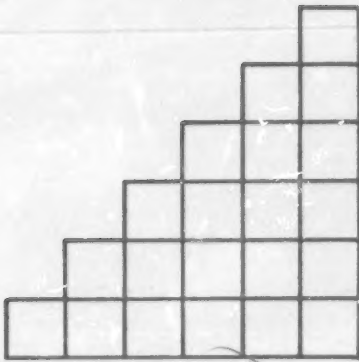
1. Answers are: 9, 11, 13,
10, 12, 14

2. Answer is:



3. 19, 26, 34.

4.



Answer is: 21 cubes

5. $10 + 12 + 14 = 36$
 $12 + 14 + 16 = 42$
 $14 + 16 + 18 = 48$
 $16 + 18 + 20 = 54$

6. Answer is: 26 pucks

3, +2=5, 6, +2=8, 9, +2=11, 12, +2=14, 15, +2=17, 18, +2=20, 21, +2=23, 24, +2=26, 25, +2=29
 5, +1=6, 10, +1=11, 15, +1=16, 20, +1=21, 25, +1=26

PROBLEM SOLVING SHEET 4.3ANSWERS AND SELECTED SOLUTIONS

1. Answer is: 12 people
2. Take the 5 litre jug and fill up the 12 litre jug. You should have 3 litres left in the 5 litre jug. Dump out the 12 litre jug. Pour the extra 3 litres (left in the 5 litre jug) into the 12 litre jug. Then fill the 5 litre jug and add it to the water in the 12 litre jug. There should be exactly 8 litres in the 12 litre jug.
3. The key to the strategy is for you to pick up 1 penny the 1st time. Then after your partners choice, choose as many coins as necessary so as to leave an odd number. Continue with this strategy until your partner has to pick up the last coin.

$$4. \quad 52 + 62 + 70 + 40 = 224$$

$$75 + 118 = 193$$

OR

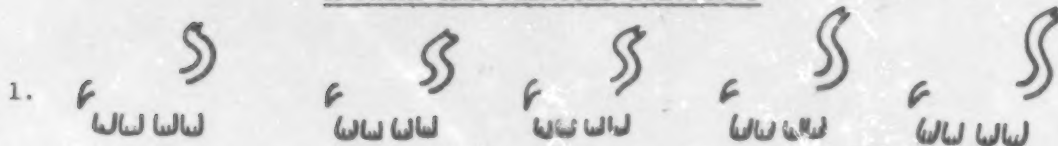
$$52 + 62 + 75 + 40 = 229$$

$$70 + 118 = 188$$

Answer is: 2 trips

5. This is one possible solution. There are others.
 Trip 1 - Leaf, Canuck, Canadien. (Canadien back)
 Trip 2 - Jets, Oiler, Canadien (Canadien back)
 Trip 3 - Flame, Canadien
6. Trip 1 - Fisherman 1, Guide 1 (Fisherman 2 Back)
 Trip 2 - Guide 2, Guide 3 (Guide 3 back)
 Trip 3 - Fisherman 1, Fisherman 2 (Fisherman 2, Guide 2 back)
 Trip 4 - Fisherman 2, Fisherman 3, (Guide 1 back)
 Trip 5 - Guide 1, Guide 2 (Guide 1 back)
 Trip 6 - Guide 1, Guide 3

Other solutions are possible.

PROBLEM SOLVING SHEET 4.4ANSWERS AND SELECTED SOLUTIONS

20 legs, 5 tails and 5 trunks $(20 \div 4 = 5)$

Answer is: 5 elephants

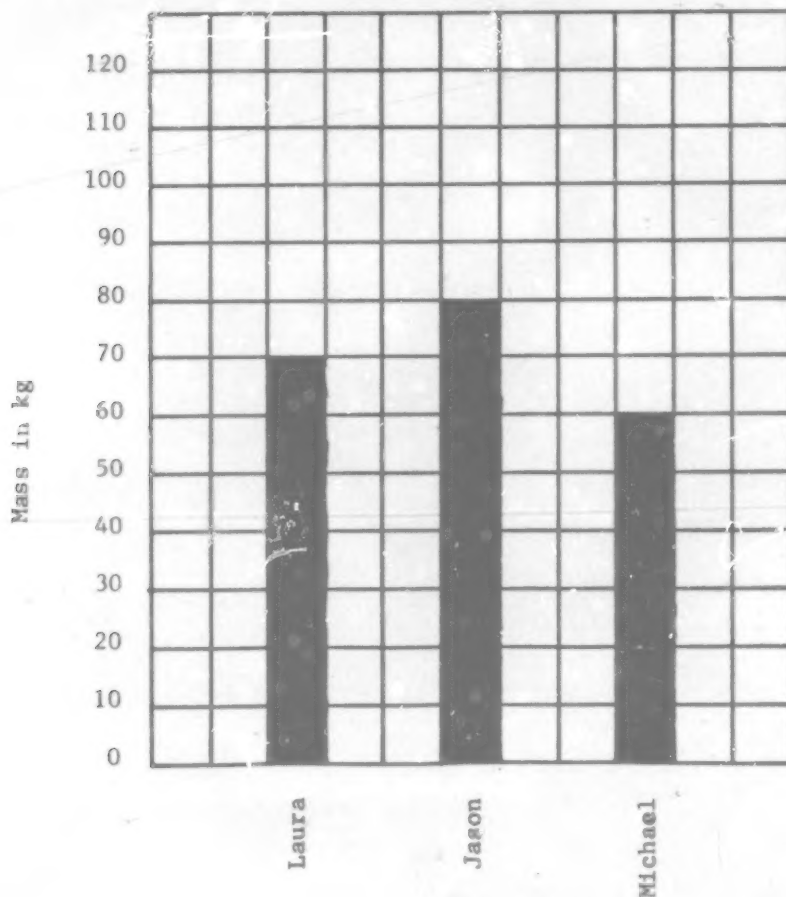
2. Hint: Draw a picture of the fence.

3	6	9	12	15	18
---	---	---	----	----	----

Answer is: 7 posts

3. Example

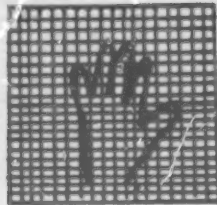
Mass Of My Friends



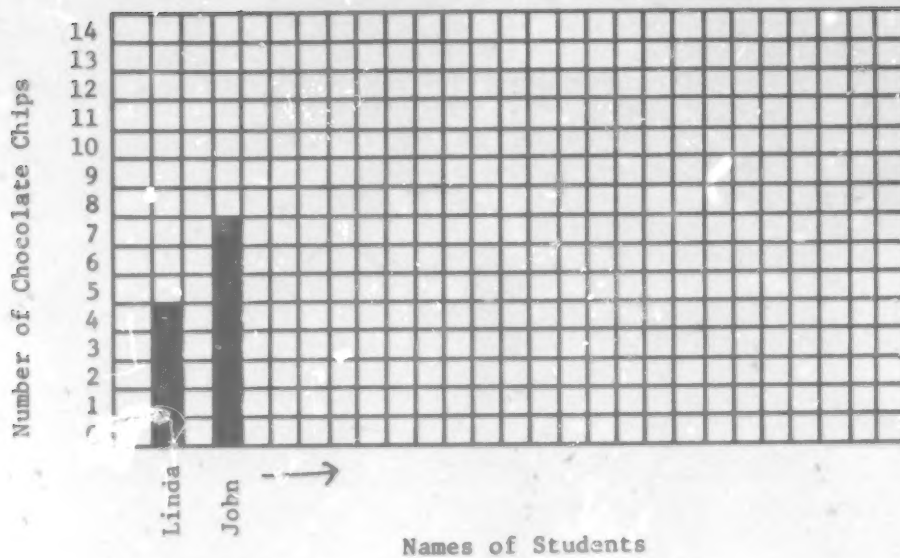
PROBLEM SOLVING SHEET 4.4ANSWERS AND SELECTED SOLUTIONS

4. Answer is: 2 cm

5. Answers will vary.



6.

Sample GraphNUMBER OF CHOCOLATE CHIPS IN EACH COOKIE

Answer will vary.

PROBLEM SOLVING SHEET 4.5ANSWERS AND SELECTED SOLUTIONS1. Answers are:

$14 + 9 = 23$

$9 + 11 = 20$

$11 + 10 = 21$

$10 + 12 = 22$

$14 + 11 = 25$

$9 + 10 = 19$

$11 + 12 = 23$

$14 + 10 = 24$

$9 + 12 = 21$

$14 + 12 = 26$

2. Answers are: 9 and 19.

Other answers are possible if the starting number is changed.

3. Total number of centimetres is: $6 + 2 + 6 + 4 = 18$

Total time to crawl is: $18 \div 2 = 9$

Total time is $9 + 5 + 5 + 5 = 24$ minutes

Answer is: 24 minutes

4. $(60 + 30) - 10 = 80$ km.

Answer is: 80 km.

5. $260 - 35 =$

$= 225$ km

Answer is: 225 km

6. $W + C = 19$

$W - C = 9$

$W \times C = 70$

$19 = 14 + 5$

$14 - 5 = 9$

$14 \times 5 = 70$

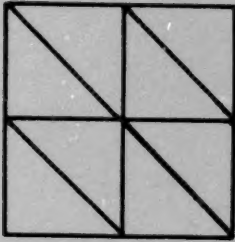
Answers are: Winnipeg - 14
Calgary - 5

PROBLEM SOLVING SHEET 4.6ANSWERS AND SELECTED SOLUTIONS

1. $\$0.20 \times 8 = \$1.60$
 $= \$0.25 \times 2 = \$0.50$
 $= \$1.60 + \$0.50 = \$2.10$

Answer is: \$2.10

2.

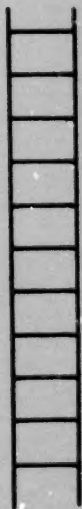


There are 8 equal triangles

$$\$0.10 \times 8 = \$0.80$$

Answer is: \$0.80

3.



Top rung

5 rungs

Half way (1 rung)

5 rungs

Answer is: 11 rungs

PROBLEM SOLVING SHEET 4.6ANSWERS AND SELECTED SOLUTIONS4. Small Cars

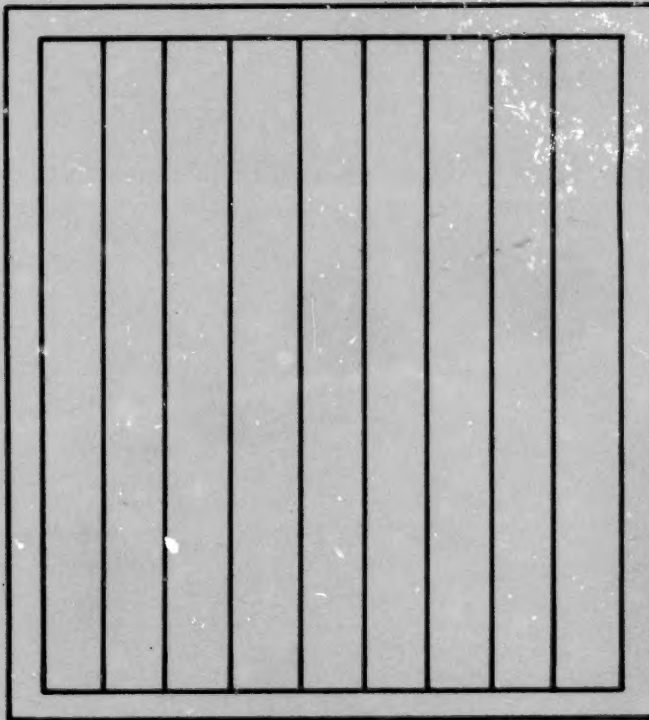
1	
3	
1	
3	
1	
3	
1	
3	
1	
3	
3	
20	

Answer is: 5 carsLarge Cars

1	
4	
1	
4	
1	
4	
1	
4	
20	

Answer is: 4 cars

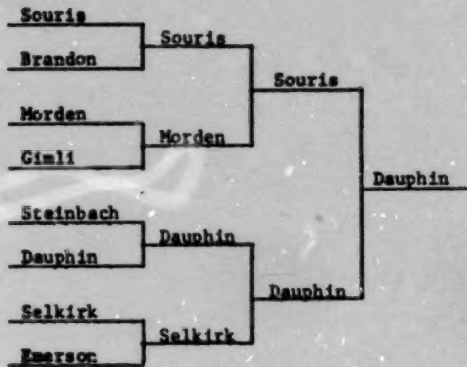
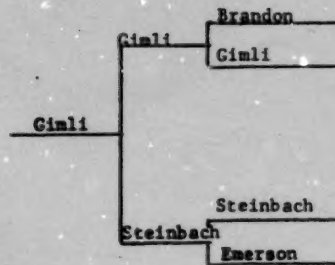
5. Scale: 1 cm = 1 m



Answer is: 8 rows or 10 rows if border is counted as a row.

PROBLEM SOLVING SHEET 4.6ANSWERS AND SELECTED SOLUTIONS

6.

Championship SideConsolation Side

PROBLEM SOLVING SHEET 4.7ANSWERS AND SELECTED SOLUTIONS

1.

Weeks	0	1	2	3	4	5	6	7	8
Km	10	14	18	22	26	30	34	38	42

Answer is: 8 weeks

2.

Nickels	Dimes	Quarters
xxxxxx		
xxxx	x	
xx	xx	
	xxx	
x		x

$6 \times 5\text{¢}$
 $(4 \times 5\text{¢}) + (1 \times 10\text{¢})$
 $(2 \times 5\text{¢}) + (2 \times 10\text{¢})$
 $(3 \times 10\text{¢})$
 $(1 \times 5\text{¢}) + (1 \times 25\text{¢})$

Answer is: 5 ways

3.

	Baseball	Tennis	Hockey	Golf
Sandy		X		
Brian			X	
Jennifer	X			
Danny				X

4. Answers are: 6, 10, 15, 21

5. Jones: $28 \div 7 = 4$ yds

Kepley: $84 \div 6 = 14$ yds

Answers are: 4 yds and 14 yds.

6. Palmateer is the Toronto Goalie, so he was saving or letting in shots made by Vancouver players. Vancouver had 30 shots on goal and 4 of those shots were goals.

Saves is $30 - 4 = 26$

Answer is: 26 saves

PROBLEM SOLVING SHEET 4.8ANSWERS AND SELECTED SOLUTIONS

1. Robert left Flin Flon at 12 00 - 5 00 = 7 00 h.
He will get to Thompson at 20 00 h + 4 h = 24 00 h.

2. 12 00 - 4 00 = 8 00 h.

Answer is 8 00 h.

3. Year 7 - 3 200

Year 6 - 1 600

Year 5 - 800

Year 4 - 400

Year 3 - 200

Year 2 - 100

Year 1 - 50

Answer is: 50 rabbits

4. 3 + 7 - 2 = 8

$$8 + 2 - 7 = 3$$

Answer is: 3

5. 2 + 10 + 10 = 10 + 12

Answer is: 10

6. 3 + 2 x 10 - 5 = 45

Working backwards

$$(45 + 5) \div 10 - 2 = \underline{3}$$

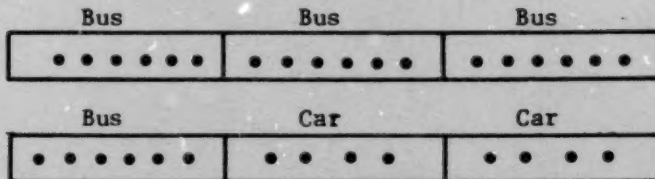
Answer is: 3

PROBLEM SOLVING SHEET 4.9ANSWERS AND SELECTED SOLUTIONS

1.	2 quarters	50	3 nickels	15
	5 dimes	50	3 quarters	75
		<u>\$1.00</u>	1 dime	10
				<u>\$1.00</u>

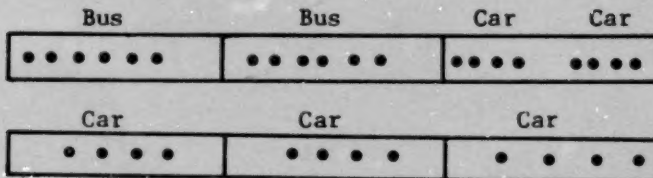
Other solutions are possible.

2. Solutions I:



Answer is: 4 buses and 2 cars

Solution II:



Answer is: 2 buses and 5 cars

3. These are some possible solutions:

$$18 + 2 = 20$$

$$2 \times 10 = 20$$

$$16 + 4 = 20$$

$$40 \div 2 = 20$$

$$14 + 6 = 20$$

$$200 \div 10 = 20$$

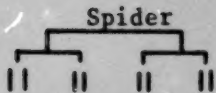
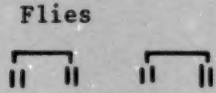
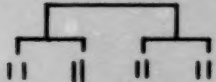
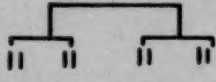
$$12 + 8 = 20$$

$$400 \div 20 = 20$$

$$10 + 10 = 20$$

There are other ways.

PROBLEM SOLVING SHEET 4.9ANSWERS AND SELECTED SOLUTIONSAnswers are:

4. a)  
- b)  
- c)  

1 spider

6 flies

2 spiders

4 flies

3 spiders

2 flies

5.

	Pork Chops	Steak	Meat Loaf
Beans	Pork Chops & Beans	Steak & Beans	Meatloaf & Beans
Carrots	Pork Chops & Carrots	Steak & Carrots	Meatloaf & Carrots
Corn	Pork Chops & Corn	Steak & Corn	Meatloaf & Corn

6. String lengths (cm) for different paths

29 cm

24 cm

22 cm

28 cm

27 cm

26 cm

Scale: 1 cm = 1 km

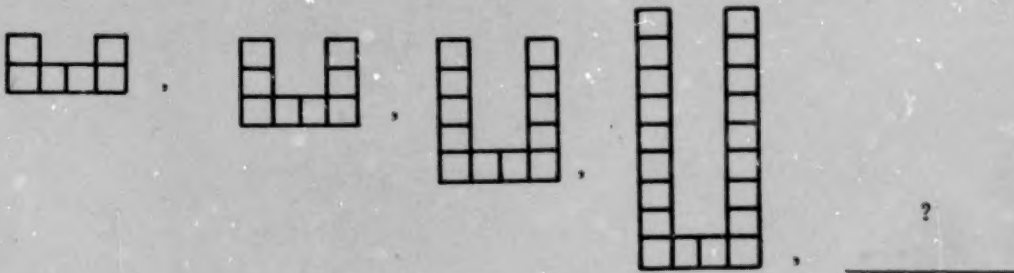
Answer is: 22 km

ASSORTED PROBLEMS

GRADE 4

ASSORTED PROBLEMS

1. How many squares ($\square$) are needed to build the (fifth) figure?



2. If Jim decides to deposit twice as much money each month in his savings account, how much money will he have saved by the end of June if he starts with \$1.00 in January?
3. A tree is 20 cm tall. The tree grows an average of 10 cm each year. How many years will it take for the tree to grow to be 140 cm tall?
4. When counting by 6's which of these numbers are not said?

12, 24, 48, 55, 56

5. Each of these letters stands for a number. Replace each letter with a number to get a correct addition problem.

$$\begin{array}{r} \text{SING} \\ + \text{SONG} \\ \hline \text{MUSIC} \end{array}$$

HINT: S = 6
G = 9
I = 5

ASSORTED PROBLEMS

6. Find all the paths an underwater diver takes to go from the surface of the lake to the bottom. The sum of the numbers in the path must be less than 38. You can move in any direction.

						Surface		
			3					
		6	7	6				
	16	18	8	3	2			
		10	15	18				
			5					

7. What is the missing number?
3, 6, 12, , 48, 96
8. The Winnipeg Blue Bombers play 16 regular season games. Last year they ended the season by winning 4 more games than they lost. How many games did they win?
9. Think of two numbers. Their product is greater than 60. Their product is less than 65. Their sum is 16. What are the two numbers?
10. Fred wants to put house numbers on his new home. He went to the hardware store and bought numbers 1, 2, and 3. What can Fred's house number be? List possible house numbers.
11. At noon two trucks start travelling in the same direction. Truck A is ahead of Truck B by 30 km. By evening Truck A has travelled 60 km and Truck B has travelled 75 km. How far apart are they now?

ASSORTED PROBLEMS

12. A bus stops at a bus stop sign every 10 minutes. How many buses would stop at the sign in one hour? In one day?
13. Popcorn at the movies never pops completely. In each batch 50 g do not pop. There are usually 2 batches popped for each show. If there are 5 shows in each day, what is the total mass of popcorn not popped?
14. It is winter tire change over time and the local service station is too busy. The owner would like to hire help but he doesn't know how much help he needs. A good tire changer can do 3 cars in 1 hour. The station has 60 cars a day to service. The station is open from 8 00 h to 19 00 h with 1 hour off for lunch. How many men does the owner need to hire?
15. Kristen would like to buy a new bicycle. Her parents give her an allowance of \$5.00/week. If the bicycle costs \$160.00, how long will it take her to save enough money to buy the bicycle? (TAX NOT INCLUDED.)
16. Put the numbers 1, 2, 3, 4, 6, 8 into the boxes to give the sum of 402.

4	0	2

ASSORTED PROBLEMS

17. Put the same number into each box to get the answer.

3	9	9	6
X			

18. Find the missing numbers.

	<u>Year</u>	<u>Goals</u>	<u>Assists</u>	<u>Points</u>
Dale Hawerchuk	1	45	—	103
Darryl Sittler	1	—	59	100
	2	38	52	—
Bryan Trottier	1	32	—	95
	2	—	42	72

19. A farmer wants to make a pen for his chickens. He only has 30 metres of fencing. What is the largest area he can enclose?
20. Bill would like to fertilize his front yard. His yard is 20 m wide and 30 m long. Each bag of fertilizer will do approximately 200 m². How many bags of fertilizer should he buy?
21. I have a certain number of stamps in my collection. My cousin gives me 2 times as many stamps as I started with. Now I have 12 stamps in my collection. How many stamps did I start with?

ASSORTED PROBLEMS

22. You put 20 blocks into 3 boxes.

Box A has 4 more blocks than Box B

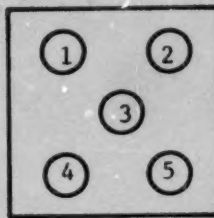
Box C has 6 fewer blocks than Box A

How many blocks are in Box A?

Box B?

Box C?

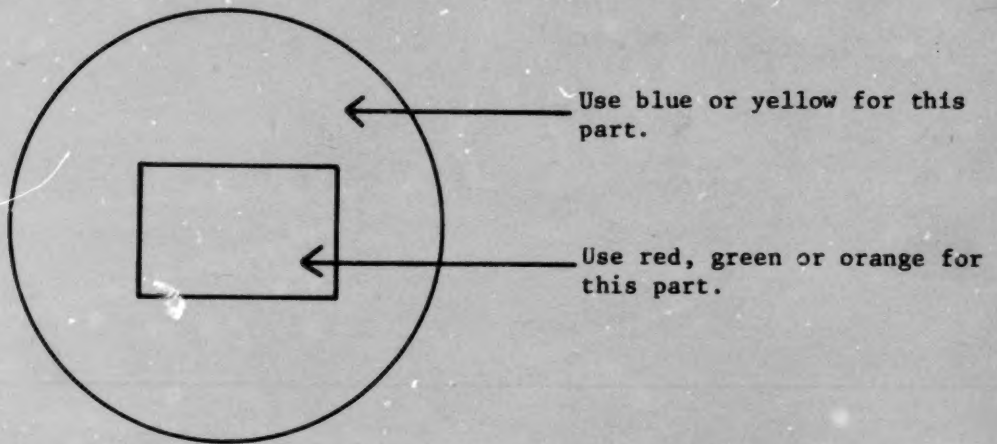
23. William has a new lock system that opens a lock if the five numbers are touched in a correct sequence. What combinations can he use if the first number must always be larger than the second in each sequence?



24. Patrick and Cathy walk to school together. Patrick takes 1 step for every metre and Cathy takes 2 steps for every metre. If Patrick takes 14 steps, how many steps would Cathy have to take?
25. Cookies sell at \$1.50 per carton. For every \$5.00 purchase of groceries, the customer gets 35¢ off on a carton of cookies. If Mrs Walker buys \$15.00 worth of groceries, how much would she pay for one carton of cookies?
26. Jane is 110 cm tall. Mary is 5 cm shorter than Jane. Linda is 9 cm taller than Mary. How tall is Linda?

ASSORTED PROBLEMS

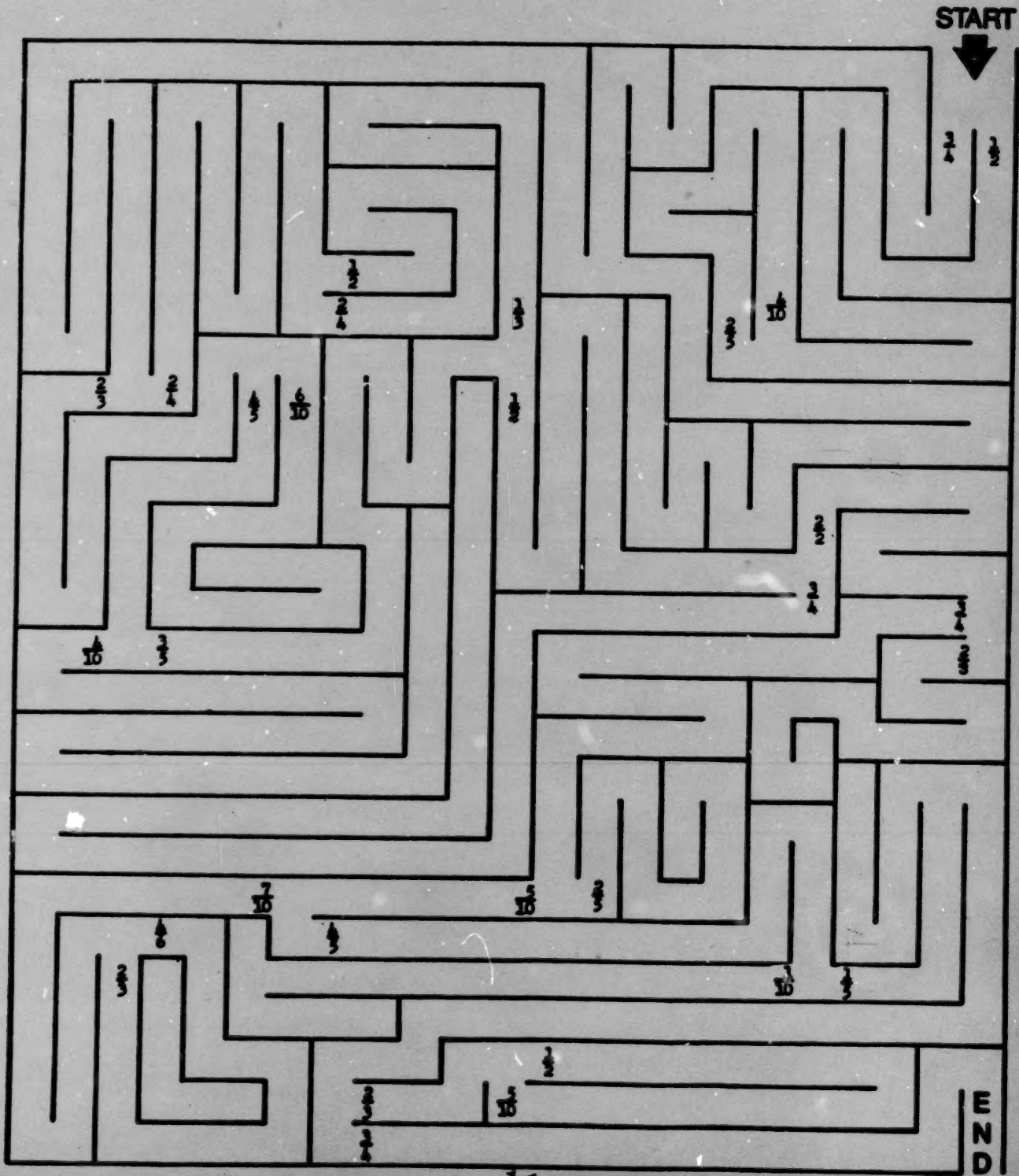
27. Jerry has 30 rabbits in one hutch and 26 rabbits in another hutch. If he sells 7 rabbits from one hutch and 13 from the other, how many rabbits are left?
28. Rick needs to find a phone number. He is told that the digits have a sum of 34. If the first 5 digits are 46453 find the possible combinations of the remaining 2 digits. Digits may be repeated.
- 29.

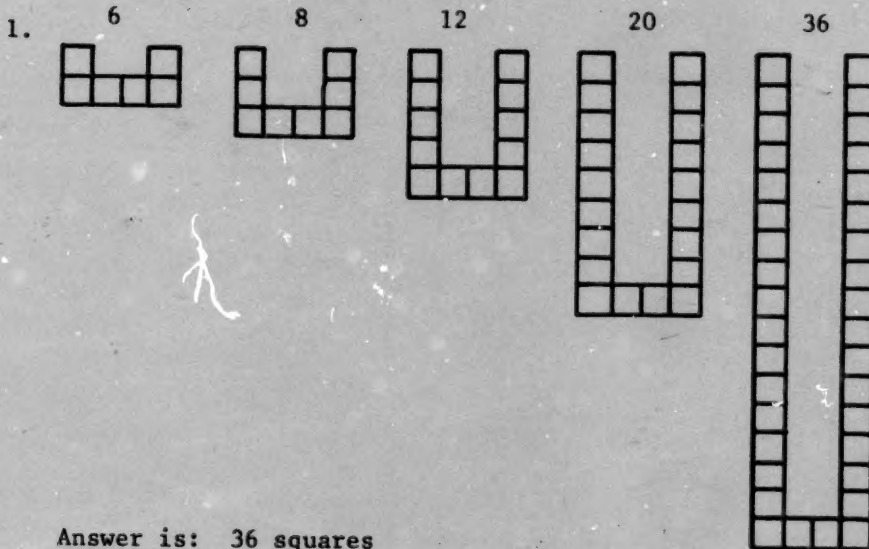


Using this colour information how many different colour patterns can you make? Draw and colour.

ASSORTED PROBLEMSPATH MATH

30. Use The Path That Follows The Greater Numbers To Find Your Way Through The Maze.



ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

Answer is: 36 squares

2.	Jan.	Feb.	March	April	May	June
	\$1.00	\$1.00 + \$2.00	\$3.00 + \$4.00	\$7.00 + \$8.00	\$15.00 + \$16.00	\$31.00 + \$32.00

$$\$31.00 + \$32.00 = \$63.00$$

Answer is: \$63.00 at the end of June

3. Amount tree needs to grow is: $140 - 20 = 120$ cm

Number of years to grow is: $120 \div 10 = 12$ years

Answer is: 12 years

4. 6, 12, 18, 24, 30, 36, 42, 48, 54, 60

Answers are: 55 and 56

5. Answer is: 6 579

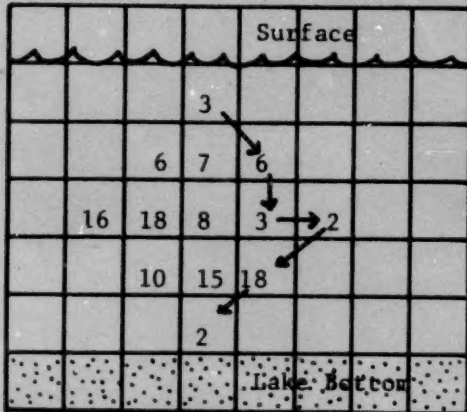
$$\begin{array}{r} 6\ 579 \\ + 6\ 079 \\ \hline \end{array}$$

$$12\ 658$$

$$O = 0, N = 7, M = 1, U = 2, C = 8$$

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

6.



One possible solution is: $3 + 6 + 3 + 2 + 18 + 5 = \underline{37}$

Other solutions: $3 + 6 + 3 + 18 + 5 = 35$
 $3 + 6 + 8 + 10 + 5 = 33$
 $3 + 7 + 3 + 17 + 5 = 33$

7. 3, 6, 12, 24, 48, 96Answer is: 248. Answer is: 10 wins 6 losses9. Answer is: 9 and 7 or 8 and 8.

10. Possible house numbers are: 123, 132, 213, 231, 312, 321

11. TRUCK A TRAVELLED 60

TRUCK B TRAVELLED 75

Difference is: $75 - 60 = 15$ km

Truck B has travelled 15 km farther

Truck A and Truck B are $30 - 15 = 15$ km apart.Answer is: 15 km

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

12. $60 \div 10 = 6$ buses stop in 1 hour

$24 \times 6 = 144$ buses stop in 1 day.

Answers are: 6 buses and 144 buses

13. $2 \times 5 = 10$ batches per day

$10 \times 50 = 500$ g do not pop each day

Answer is: 500 g

14. Find the number of hours the service station is open with 1 hour for lunch.
-
- It is open 10 hours.

If 1 man can do 3 cars in 1 hour, then 1 man can do $3 \times 10 = 30$ cars in one day.The number of men needed to do 60 cars in one day is $60 \div 30 = 2$ Answer is: 2 men

15.

$$\begin{array}{r} 32 \\ \$5.00 \overline{) \$160.00} \end{array}$$

Answer is: 32 weeks

16.

Possible solutions:

	2	3	8	$\begin{array}{r} 234 \\ +168 \\ \hline 402 \end{array}$	$\begin{array}{r} 268 \\ +134 \\ \hline 402 \end{array}$	$\begin{array}{r} 138 \\ +264 \\ \hline 402 \end{array}$	$\begin{array}{r} 264 \\ +138 \\ \hline 402 \end{array}$
+	1	6	4	$\begin{array}{r} 168 \\ +234 \\ \hline 402 \end{array}$	$\begin{array}{r} 164 \\ +238 \\ \hline 402 \end{array}$	$\begin{array}{r} 134 \\ +268 \\ \hline 402 \end{array}$	$\begin{array}{r} 264 \\ +138 \\ \hline 402 \end{array}$
	4	0	2				

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

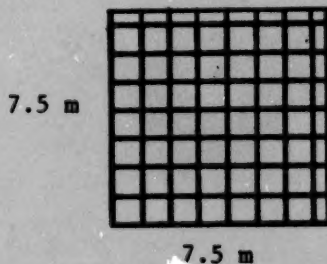
17.

$$\begin{array}{r}
 \boxed{6} \quad \boxed{6} \quad \boxed{6} \\
 \quad \quad \times \quad \boxed{6} \\
 \hline
 3 \quad 9 \quad 9 \quad 6
 \end{array}$$

18.

	<u>Year</u>	<u>Goals</u>	<u>Assists</u>	<u>Points</u>	
Dale Hawerchuk	1	45	<u>58</u>	103	$103 - 45 = 58$
Darryl Sittler	1	<u>41</u>	59	100	$100 - 59 = 41$
	2	38	52	<u>90</u>	$38 + 52 = 90$
Bryan Trottier	1	32	<u>63</u>	95	$95 - 32 = 63$
	2	<u>30</u>	42	72	$72 - 42 = 30$

19. Using graph paper where each square represents 1 m, find the solution by trial and error.



Answer is: 7.5 m long and 7.5 m wide.

20. Length $\times$ width = area

$$30 \times 20 = 600 \text{ m}^2$$

$$200 \overline{) 600}^3$$

He would need 3 bags of fertilizer.

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

21. $\square$ = the number of stamps you have in the beginning.

$$\square + (2 \times \square) = 12$$

Answer is: 4 stamps

Remember: value of each box is the same in the number sentence.

22.

$\square$	$\square$	$\square$	$\square$	$\square$	$\square$	$\square$	$\square$	$\square$	$\square$
-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------

Box A (10)

$\square$	$\square$	$\square$	$\square$	$\square$	$\square$
-----------	-----------	-----------	-----------	-----------	-----------

Box B (6)

$\square$	$\square$	$\square$	$\square$
-----------	-----------	-----------	-----------

Box C (4)

Use guess and check.

23. There are 60 possible combinations. Among these are:

2, 1, 3, 4, 5
 3, 2, 4, 5, 1
 3, 1, 4, 5, 2
 5, 4, 3, 2, 1
 5, 3, 2, 1, 4

5, 2, 1, 4, 3
 5, 1, 4, 3, 2
 4, 3, 2, 1, 5
 4, 2, 1, 5, 3
 4, 1, 5, 3, 2

24.

Patrick

1	2	3	4	5	---	---	---	---	---	14
2	4	6	8	10	---	---	---	---	---	28

Cathy

Answer is: 28 steps

25. Amount of discount is $\$.35 \times 3 = \$1.05$

Amount paid for cookies is $\$1.50 - \$1.05 = \$.45$

Answer is: \$.45

26. Mary's height is $110 - 5 = 105$ cm

Linda's height is $105 + 9 = 114$ cm

Answer is: 114 cm

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

27. Total number of rabbits is: $30 + 26 = 56$

Total rabbits removed is: $7 + 13 = 20$

Number of rabbits left is: 36

Answer is: 36 rabbits

28. Step (1) $464 \begin{array}{r} 53 \\ \underline{22 + 12} \end{array} = 34$

Step (2) $12 = 3 + 9$

$$9 + 3$$

$$= 4 + 8$$

$$8 + 4$$

$$= 5 + 7$$

$$7 + 5$$

$$= 6 + 6$$

Step (3) Possible phone numbers are:

464 5339

93

48

84

57

75

66

29. Circle

blue	blue	blue	yellow	yellow	yellow
red	green	orange	red	green	orange

Rectangle

There are 6 different colour combinations.

PROBLEM SOLVING SHEETS

GRADE 5

CURRICULUM CHART: GRADE 5

CURRICULUM TOPICS										STRATEGIES									
PROBLEM SHEETS	Whole Number Operations	Estimating And Rounding Off	Patterns	Fractions	Decimals	Graphing	Measurement	Geometry		Guess and Check	Look for a Pattern	Act it Out	Diagram (Draw/Graph)	Write A Number Sentence	Make a Model	Make a Table	Solve a Simpler Problem	Work Backwards	Account for all Possibilities
										5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	5.10
5.1	o		o				o			x		v	v						v
5.2	o		o		o					v	x		v	v		v			v
5.3	o	o	o		o					v	v	x	v		v	v			v
5.4	o	o	o		o	o	o			v	v		x		v	v			v
5.5	o	o	o	o	o		o			v	v	v	v	x		v			
5.6	o		o				o	o		v	v	v	v		x	v			
5.7	o		o				o			v	v	v	v	v	v	x	v		
5.8	o	o	o	o	o		o	o		v	v			v		v	x		v
5.9	o	o	o	o	o		o			v	v	v		v	v	v		x	v
5.10	o		o				o			v	v	v	v	v	v	v			x

o - curriculum topic
 x - key strategy
 v - alternative strategy

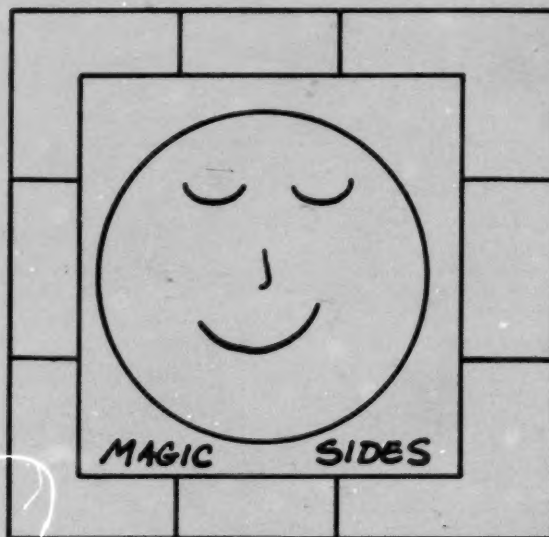
18 Assorted Problems

PROBLEM SOLVING SHEET 5.1GUESS AND CHECK

1. Use the numbers 6, 18, 12 and 9 to make the following a true number sentence.

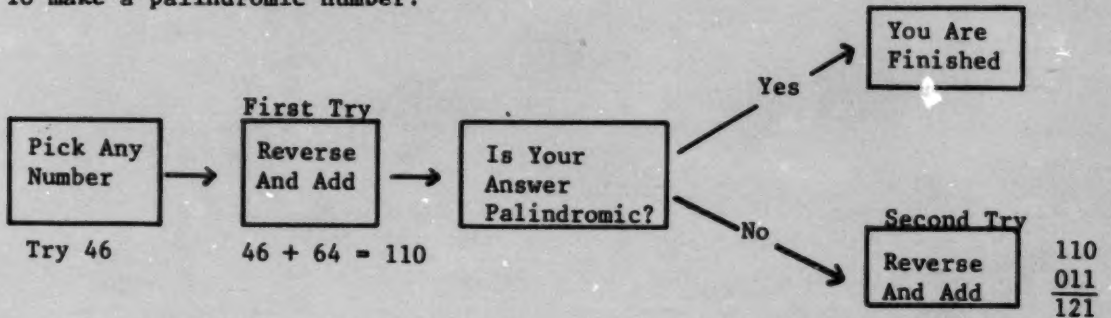
$$\square \times \square \div \square = \square$$

2. 500 mL of chip dip and a box of potato chips cost \$1.64. Two hundred and fifty mL of chip dip, which costs one-half the price of 500 mL, and 2 boxes of potato chips cost \$1.99. Find the cost of a box of potato chips.
3. Arrange 1, 2, 3, 4, 4, 5, 6, 6, in the square so that vertical and horizontal sums are equal. (More than 1 solution is possible.)



PROBLEM SOLVING SHEET 5.1GUESS AND CHECK

4. Bob explained to Lil that their names were palindromic and his age of 11 was a palindromic number because the digits were the same if reversed. To make a palindromic number:



Start with each of these numbers. Use the above method to make a palindromic number.

16 28 36 527 178

5. A salesman at a meat packing plant sells meat in packages of 16, 17, 23, 24, 39, and 40 kg weights. He will not sell meat in any other way and he refuses to break up packages. One of his customers ordered 100 kg of meat. Fill the order for the salesman. Remember packages cannot be broken.
6. What 2 numbers in the box will give a quotient of 16?

13		168
	14	
	2	
208		12

PROBLEM SOLVING SHEET 5.2LOOK FOR A PATTERN

1. Study the figures and complete the chart.



Fig. 1



Fig. 2

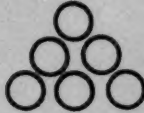


Fig. 3

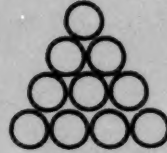


Fig. 4

Figure	1	2	3	4	5	6	7	8	9	10
Total Number Of Circles										

2. Your aunt gives you \$1.00 on your first birthday; \$2.00 on your second birthday; \$4.00 on your third birthday and doubles the amount each year. On which birthday would you receive more than \$1024.00?
3. For the number 12 345 679 use the following multiples of nine as multipliers to find a pattern:

9, 18, 27, 36, 45, 54, 63, 72

4.



This is a SCOOBIE.



This is a SCOOBIE.



This is not a SCOOBIE.



This is not a SCOOBIE.



Is this a SCOOBIE?



Is this a SCOOBIE?



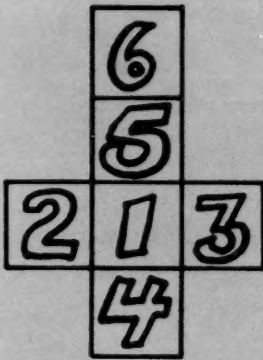
Is this a SCOOBIE?

PROBLEM SOLVING SHEET 5.2LOOK FOR A PATTERN

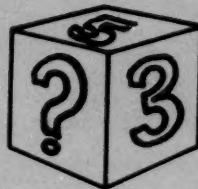
5. Find the next 3 numbers in the following sequence.

2, 5, 11, 23, ____, ____, ____.

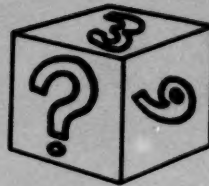
6.



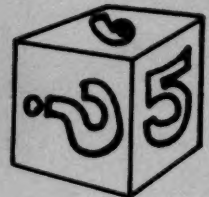
If this pattern was formed to make a cube, what numbers would appear where the question marks are?



A



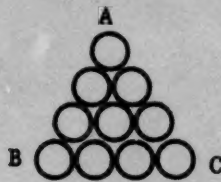
B



C

PROBLEM SOLVING SHEET 5.3ACT IT OUT

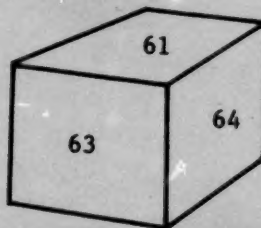
1. Jane has 11 coins. She has 60¢ and can make change for a quarter. What coins does she have?
2. Can you make A in $\triangle$ ABC point in the opposite direction so that it points to the bottom of the page by moving only 3 coins?



3. What is the least number of coffee stirrers needed to make exactly 7 congruent squares that are side by side?
4. There are 16 students in Mr. Warren's gym class. In one exercise he asked each student to contact every student in the class by placing the soles of their right feet together once only. How many contacts would there be?
5. There are 28 students in Miss Reagan's class. Twelve students can ice skate and fifteen can roller skate. Nine of the students can do both. Four of the students play tennis. How many students in Miss Reagan's class can not ice skate or roller skate?
6. Ms. Walker's class of 19 students exchanged Valentine cards. If each student receives one card from everyone else (not including Ms. Walker) in the class, how many cards were exchanged?

PROBLEM SOLVING SHEET 5.4DIAGRAM (DRAW/GRAPH)

1. Crafty Cal bought a dog for \$60. After a week he sold it for \$70. Two weeks later, he bought it back for \$90. A week later he sold it for \$100. How much did Cal make or lose on this dog?
2. John gets on an elevator at the first floor. He goes up to the ninth floor then comes down 3 floors. He then goes up 1 floor and down 4 floors. What floor is John on now?
3. Two man bicycle teams have been set up in Winnipeg for a charity "RUN-BIKEATHON". Each team is given only 1 bicycle and must cover 100 km to finish the course. If one person on the team begins riding a certain distance, and then leaves the bicycle behind for the other person to use when he catches up, where should the bicycle be left if each person rides the bicycle twice and runs twice? Assume each person rides and runs at the same speed and the same distance.
4. John always sits in the same pew at the church. The pew is second from the front and eighth from the back. There is a center aisle. Each pew seats 6 persons. What is the seating capacity in John's church?
5. The numbers on the faces of this cube are consecutive. What is the highest possible number on the cube?



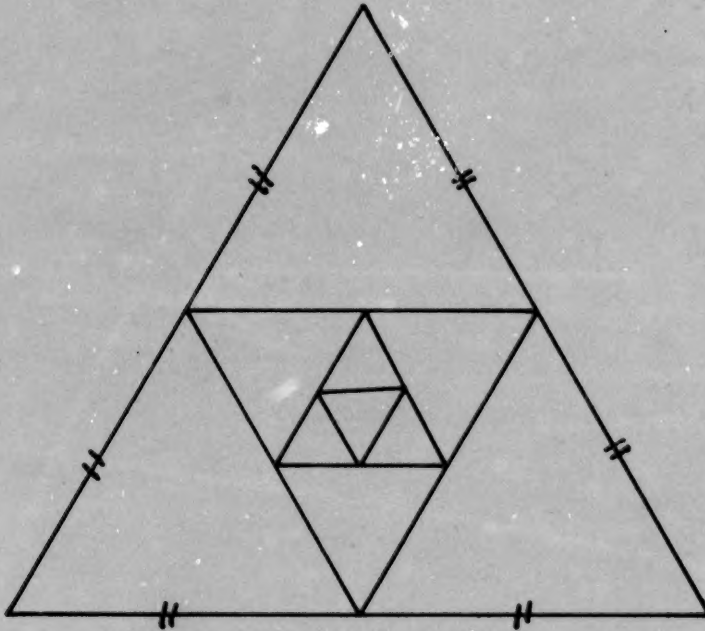
6. Start at x. Travel due east at 100 km per hour for 30 minutes. Then travel due west at 90 km per hour for 20 minutes. How far and in what direction will you be from your starting point at the end of the fifty minutes?

PROBLEM SOLVING SHEET 5.5MAKE A NUMBER SENTENCE

1. Susan drove an average of 500 km a day for 3 days. She drove 600 km on the first day and 300 km on the second day. How many km did she drive on the third day?
2. A weekly magazine subscription costs \$48.00 a year but bought singly costs \$1.25 per issue at the newstand. Which is the best way to buy the magazine? How much is the saving?
3. How many legs are on 10 dogs, 12 cats and 3 chickens?
4. The odds on a horse running at Assiniboia Downs are given as 9 to 1 to win. What amount must a person bet to receive a payout of \$1 800.00?
5. Gary's watch loses 11 seconds per day. How much time would it lose in March and April combined? Record your answer in as many different time units as you can.
6. In the morning, the odometer on Vern's motorcycle showed 4625.4 km. At night it showed 4956.3 km. How many km had the motorcycle been driven that day?

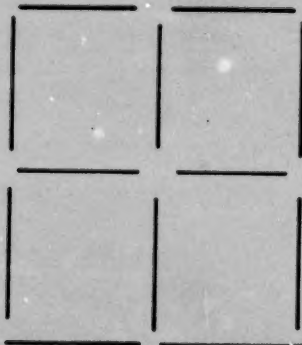
PROBLEM SOLVING SHEET 5.6MAKE A MODEL

1. Construct an equilateral triangle having a base of 10 cm and construct 3 smaller triangles as shown in the diagram. Measure and record the perimeter of each triangle. Is there a pattern to the perimeters of the triangles? What is it?



2. Using the figures below:

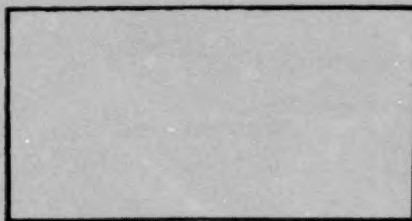
- a) Rearrange 3 coffee stirrers to make 3 squares of the same size.
- b) Rearrange 4 coffee stirrers to make 3 squares the same size.



PROBLEM SOLVING SHEET 5.6MAKE A MODEL

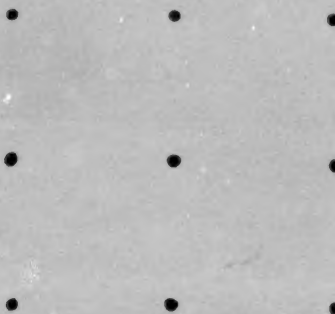
3. Take a piece of paper and tear it in half. Take the two pieces, put them together and tear those in half. Put the four pieces together and tear them in half. How many tears would you have to make to end up with 16 pieces of paper? How many pieces of paper would you have after 8 tears?
4. Fold a rectangular piece of paper in half. Then fold it in half again and cut off a corner that does not involve an edge of the original paper.
 - A) How many holes are produced with 3 folds; 4 folds; 5 folds?
 - B) How many folds would there be with 64 holes; 256 holes?
5. How many 3 cm x 6 cm cards does Mary need to cover this rectangle?

15 cm



18 cm

6. Arrange 4 coffee stirrers so that they pass through all the nine points.

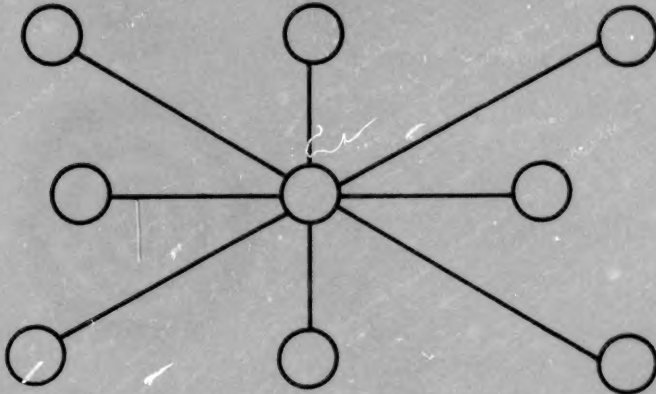


PROBLEM SOLVING SHEET 5.7MAKE A TABLE

1. How many even numbers are there between 211 and 361?
2. There are 4 semi-finalists competing for 2 places in the finals for the Mr. Manitoba competition at the Red River Exhibition. In how many different ways can the first and second places be determined?
3. Fred, Sam, Mary and Alice hold the following occupations: art critic, architect, acrobat and aviator, but not necessarily in the stated order. Fred is a bachelor, Mary has never heard of perspective, and the aviator who is happily married earns more than his sister the art critic. Who is the architect?
4. Mr. Green has a small farm near Steinbach, Manitoba. He has chickens and cows on his farm. If there are 32 legs altogether, what is the greatest number of cows possible?
5. A motorcycle travels 57 km in the time that a bicycle travels 10 km. At this rate how far will the motorcycle travel when the bicycle travels 45 km?
6. List the different combinations of nickels and dimes that make 55¢.

PROBLEM SOLVING SHEET 5.8SOLVE A SIMPLER RELATED PROBLEM

1. Place the numbers 1 through 9 in the circles using each number only once so that the sum of each line is 15:



2. Approximately how many times will 6 appear on a die in 1000 tosses?
3. Find the thickness of one page in your mathematics text book.
4. Mr. Scott operates an apple orchard in Morden. He has 3 baskets of apples sorted with a different number in each.
Basket A is full of shiny red apples, basket B has 3 times as many apples as basket A, and basket C has $\frac{1}{2}$ as many apples as basket A. How many apples are in each basket if the total number in all three baskets is 63?
5. Gerry Woodman is a chain saw dealer. He keeps a container of gas/oil mix on hand at all times. The ratio of gas to oil is 160 ml of gas to 10 ml of oil. He has been asked to demonstrate a new line of chain saws at the "Winnipeg Home Expressions Show". He prepares the gas/oil mix that he will need ahead of time. How much gas and how much oil will he need in order to fill an 850 ml container?
6. A ferry travels 150 km between Cape Rondelay and Port of Sound. It makes the round trip twice a day. How many km does it travel in the month of August?

PROBLEM SOLVING SHEET 5.9WORK BACKWARDS

1. What is the starting number?

(?)

[x 7]

[÷ 5]

[- 5]

[+4.30]

(8.05)

2. Twenty players enter a chess tournament. If each player plays until he loses a game, how many games must be played to determine the champion?
3. Barry Long, the coach of the Winnipeg Jets, has a busy day ahead of him. He has to dedicate a building in Winnipeg at 09 30 h, speak at a luncheon in Souris at 13 30 h, and open the Russell fair at 16 45 h. If it takes 3 hours to drive from Winnipeg to Souris and 2 hours to drive from Souris to Russell, what time must he leave Winnipeg, and what time must he leave Souris in order to be on time for his engagements?

PROBLEM SOLVING SHEET 5.9WORK BACKWARDS

4. Today John has 25 marbles. Yesterday he won 8 marbles; on the way home from school he lost 3, the day before he had divided his marbles evenly among his family.
- If there are 5 people in his family including John, how many marbles did John begin with?
5. Mary and Bill each have \$72.00 in their bank account after making their deposit on December 1.
- If Bill has deposited \$5.00 and Mary \$4.00 on the first day of each month of that year, how much would each have had in their bank accounts before making their deposits in June 1?
- (Use the calendar below). Interest is not considered.

JANUARY	FEB	MARCH
S M T W T F S	S M T W T F S	S M T W T F S
1 2 3 4	1 2 3 4	1 2 3 4
5 6 7 8 9	5 6 7 8 9	5 6 7 8 9
10 11 12 13 14	10 11 12 13 14	10 11 12 13 14
15 16 17 18 19	15 16 17 18 19	15 16 17 18 19
20 21 22 23 24	20 21 22 23 24	20 21 22 23 24
25 26 27 28 29	25 26 27 28 29	25 26 27 28 29
30 31	28 29	30 31
APRIL	MAY	JUNE
S M T W T F S	S M T W T F S	S M T W T F S
1 2 3 4 5	1 2 3 4	1 2 3 4
6 7 8 9 10 11	5 6 7 8 9 10	5 6 7 8 9 10
12 13 14 15 16	11 12 13 14 15	11 12 13 14 15
17 18 19 20 21	16 17 18 19 20	16 17 18 19 20
22 23 24 25 26	21 22 23 24 25	21 22 23 24 25
27 28 29 30	26 27 28 29 30	26 27 28 29 30
31	31	31
JULY	AUGUST	SEPTEMBER
S M T W T F S	S M T W T F S	S M T W T F S
1 2 3 4 5	1 2 3	1 2 3 4
6 7 8 9 10 11	4 5 6 7 8 9	5 6 7 8 9 10
12 13 14 15 16	10 11 12 13 14	11 12 13 14 15
17 18 19 20 21	15 16 17 18 19	16 17 18 19 20
22 23 24 25 26	20 21 22 23 24	21 22 23 24 25
27 28 29 30 31	25 26 27 28 29	26 27 28 29 30
31	30 31	31
OCTOBER	NOVEMBER	DECEMBER
S M T W T F S	S M T W T F S	S M T W T F S
1 2 3 4	1 2 3 4	1 2 3 4
5 6 7 8 9	5 6 7 8 9	5 6 7 8 9
10 11 12 13 14	10 11 12 13 14	10 11 12 13 14
15 16 17 18 19	15 16 17 18 19	15 16 17 18 19
20 21 22 23 24	20 21 22 23 24	20 21 22 23 24
25 26 27 28 29	25 26 27 28 29	25 26 27 28 29
30 31	30 31	30 31

6. When we reached our destination the car's odometer read 35 470.2 km. We had been travelling for four days. On the first day we travelled north and drove 117 km. On the second day we travelled south 276 km. On the third day we travelled east 316.5 km and on the fourth day we travelled 84.3 km. What was the odometer's reading when we began our journey?

PROBLEM SOLVING SHEET 5.10ACCOUNT FOR ALL POSSIBILITIES

1. How many 3 digit numbers can be formed with the digits, using each digit once only in each number listed below?
0, 1, 2, 3,
2. How many numbers greater than 11 and less than 90 give a remainder of 1 when divided by 5?
3. At the Winnipeg Arena, Lincoln School began arriving for the Shrine Circus. The first arrival was Sammy who was afraid he would miss the elephants. Each group arriving after Sammy had 2 more persons than the group that arrived before them. How many students attended the circus if 20 groups came in all?
4. The symbols * and $\square$ each stand for a different digit. Find the digits which would make the following example true.

$$\begin{array}{r}
 183 \\
 \times \quad * \square \\
 \hline
 73 * \\
 366 \\
 \hline
 \square 39 *
 \end{array}$$
5. Fred is 5 years older than Allan. Allan is 3 years younger than Mary. Fred is 15 years old. How old is Mary?
6. How many 4 cm by 8 cm cards would you need to cover a rectangle that is 20 cm by 40 cm?

PROBLEM SOLVING SHEET 5.1ANSWERS AND SELECTED SOLUTIONS

1. Answers:

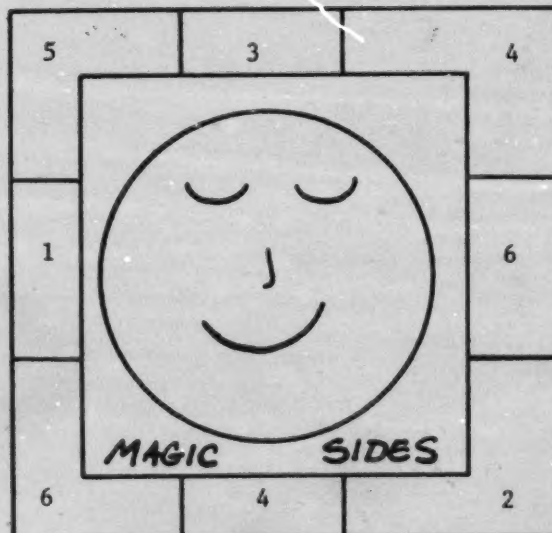
$$\boxed{18} \times \boxed{6} \div \boxed{9} = \boxed{12}$$

2.

	<u>Dip</u>		<u>Chips</u>		
Guess:	\$.64	+	\$1.00	= \$1.64	
Check:	\$.32	+	\$2.00	= \$2.32	(too high)
Guess:	\$.94	+	\$0.70	= \$1.64	
Check:	\$.47	+	\$1.40	= \$1.87	(too low)
Guess:	\$.86	+	\$0.78	= \$1.64	
Check:	\$.43	+	\$1.56	= \$1.99	

A box of chips costs \$0.78

3. One possible solution:



PROBLEM SOLVING SHEET 5.1ANSWERS AND SELECTED SOLUTIONS

4.

Start with	16	28	36	527	178
Palindromic Number	77	121	99	3773	15 851

5. Answer is:

4 pkg. of 17 kg.

2 pkg. of 16 kg.

6. Answer is:

13 and 208

PROBLEM SOLVING SHEET 5.2ANSWERS AND SELECTED SOLUTIONS

1.

Figure	1	2	3	4	5	6	7	8	9	10
Total Number Of Circles	1	3	6	10	15	21	28	36	45	55

2. Solution:

Dollar	Birthday
\$1.00	1
\$2.00	2
\$4.00	3
\$8.00	4
\$16.00	5
\$1024.00	11

Answer is: 11th birthday

3. Beginning with 9 as a multiplier, the students find that each consecutive multiple repeats the product order with numbers 1 greater than those of previous product.
e.g.

$$\begin{array}{r} 12\ 345\ 679 \\ \times\quad 9 \\ \hline 111\ 111\ 111 \end{array}$$

$$\begin{array}{r} 12\ 345\ 679 \\ \times\ 18 \\ \hline 222\ 222\ 222 \end{array}$$

$$\begin{array}{r} 12\ 345\ 679 \\ \times\ 27 \\ \hline 333\ 333\ 333 \end{array} \text{ and so forth}$$

4. Solution:

A SCOOBIE is a figure containing a triangle.

- Answers are: A) Yes
B) Yes
C) Yes

PROBLEM SOLVING SHEET 5.2ANSWERS AND SELECTED SOLUTIONS

5. Hint: $(n \times 2) + 1$

$$(11 \times 2) + 1 = 23$$

$$(23 \times 2) + 1 = 47$$

Answer is: 47, 95, 191.

6. Answers are:

Block A is 1.

Block B is 4.

Block C is 2.

PROBLEM SOLVING SHEET 5.3ANSWERS AND SELECTED SOLUTIONS

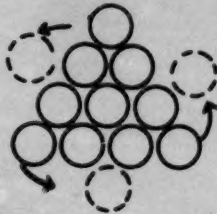
1. Use coinage and act it out.

Answers are:

1 quarter	5 dimes	1 dime
1 dime	1 nickel	10 nickels
4 nickels	OR 5 pennies	OR
5 pennies		

2. HINT: Use bingo chips, or bottle caps to act it out.

Answer is:



3. Use coffee stirrers to act it out. Form congruent squares.

Answer is: 22

4. Use gym mats on the floor and have 16 students act it out. Count one for each contact. Be sure the same contact is not counted twice.

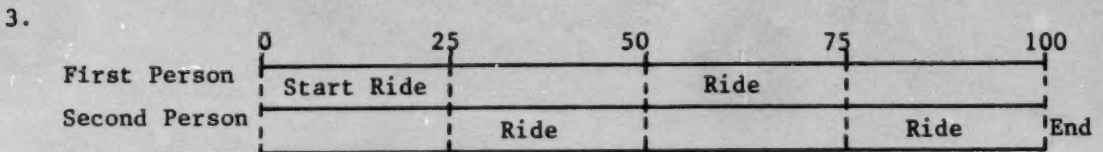
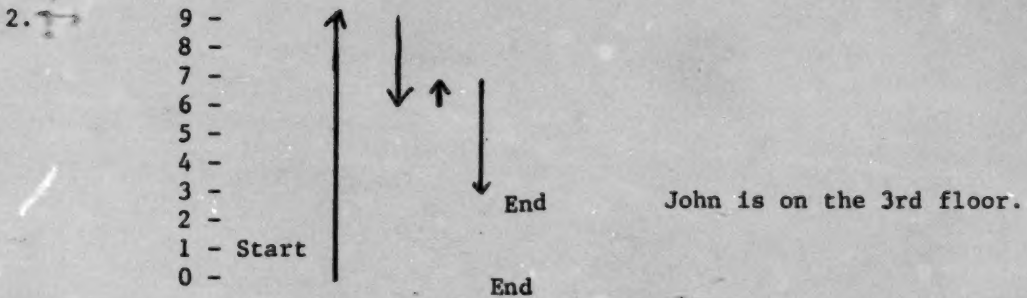
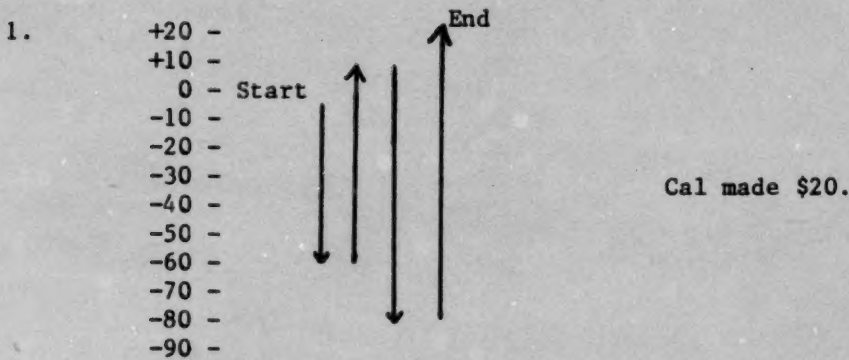
Answer is: 120

5. Have students act out the problem by assigning each one a specific role - i.e. roller skaters, ice skaters, tennis players and so forth.

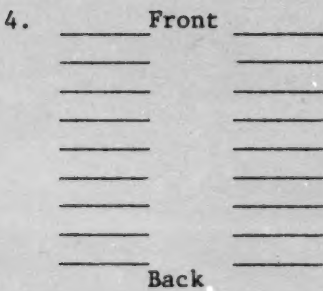
Answer is: 1

6. Make cards from construction pages and act it out.

Answer is: 342

PROBLEM SOLVING SHEET 5.4ANSWERS AND SELECTED SOLUTIONS

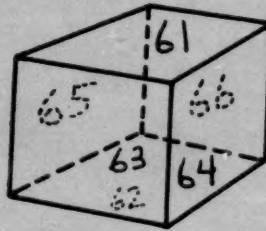
The bicycle will be left at the 25, 50, and 75 km marks.



The seating capacity in John's church is 108.

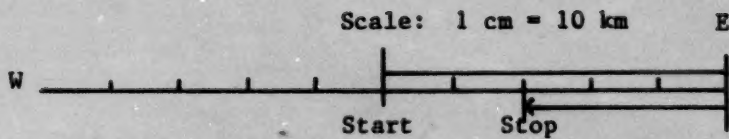
PROBLEM SOLVING SHEET 5.4ANSWERS AND SELECTED SOLUTIONS

5. The highest possible number on the cube is 66.



Answer is: 66

6.



You will be 20 km due east of the starting point.

PROBLEM SOLVING SHEET 5.5ANSWERS AND SELECTED SOLUTIONS

1. HINT:

$$\begin{array}{r}
 600 \\
 300 \\
 + \quad \\
 \hline
 1500
 \end{array}$$

Let n = distance travelled on 3rd day.

$$600 + 300 + n = 1500$$

$$900 + n = 1500$$

$$n = 1500 - 900$$

$$n = 600 \text{ km}$$

Susan drove 600 km on the third day.

2. Let n be the savings.

$$n = (\$1.25 \times 52) - \$48.00$$

$$n = \$65.00 - \$48.00$$

$$n = \$17.00$$

The best way to buy is with a subscription. The saving is $\$17.00$.

3. Let n = total number of legs.

$$n = (10 \times 4) + (12 \times 4) + (2 \times 3)$$

$$n = 94$$

There are 94 legs in all.

4. Let n = Amount to bet.

$$n = \$1800.00 \div 9$$

$$n = \$200.00$$

One must bet $\$200.00$.

PROBLEM SOLVING SHEET 5.5ANSWERS AND SELECTED SOLUTIONS

5. Let n = the amount of time the watch loses.

$$n = (30 + 31) \times 11$$

$$n = 61 \times 11$$

$$n = 671 \text{ seconds or } 11 \text{ minutes, } 11 \text{ seconds.}$$

In March and April, Gary's watch loses 671 seconds or 11 minutes, 11 seconds.

6. Let n = number of km the motorcycle was driven.

$$n = 4956.3 - 4625.4$$

$$n = 330.9 \text{ km}$$

PROBLEM SOLVING SHEET 5.6ANSWERS AND SELECTED SOLUTIONS

1. Perimeters are:

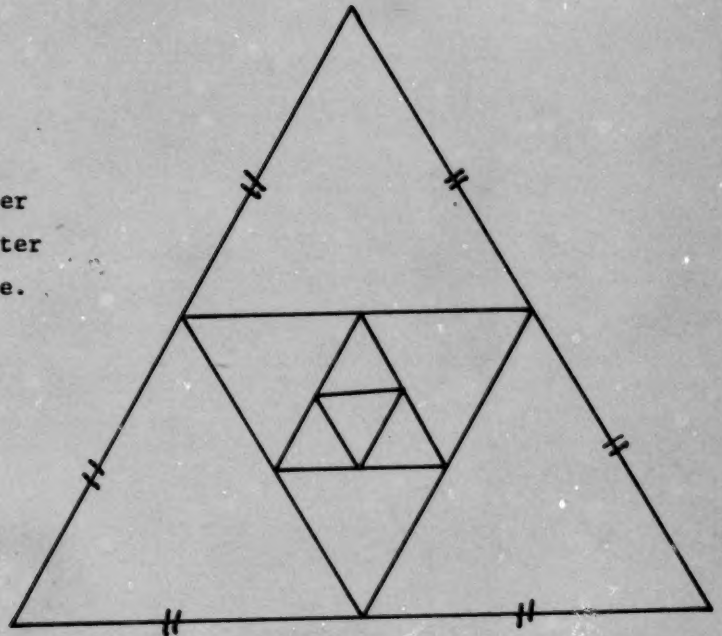
30 cm

15 cm

7.5 cm

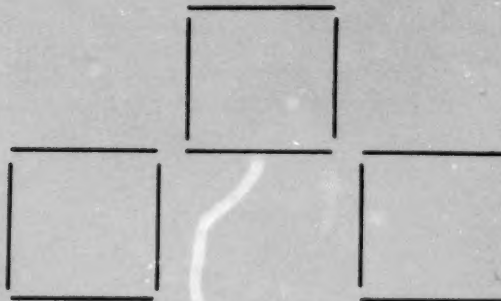
3.75 cm

The perimeter of each smaller triangle is half the perimeter of the next largest triangle.



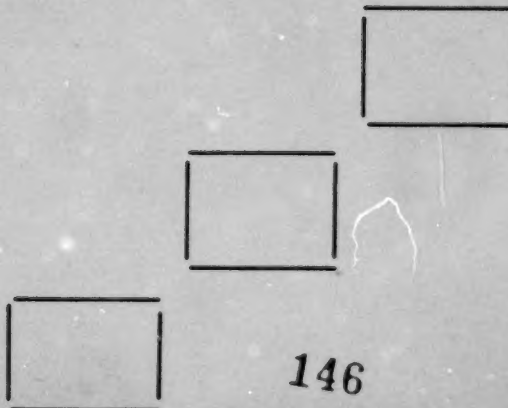
2. A)

3 coffee stirrers:



B)

4 coffee stirrers:



PROBLEM SOLVING SHEET 5.7ANSWERS AND SELECTED SOLUTIONS

1. Number of Even Numbers

211 - 220	5
221 - 230	5
231 - 240	5
↓ 15 sets	
351 - 360	5

Number of even numbers
is $15 \times 5 = \underline{75}$

- 2.
- 1st Place

(A) 

AB → 1st Place
AC → 2nd Place
AD

(B) 

BA
BC
BD

(C) 

CA
CB
CD

(D) 

DA
DB
DC

There are 12 different ways

- 3.

	Art Critic	Acrobat	Architect	Aviator
Fred			ⓧ	
Sam				X
Mary		X		
Alice	X			

Fred is the Architect.

PROBLEM SOLVING SHEET 5.7ANSWERS AND SELECTED SOLUTIONS

4.

<u>Number of Cows</u>	<u>Number of Chickens</u>	<u>Total Legs</u>
1	14	32
2	12	32
3	10	32
4	8	32
5	6	32
6	4	32
7	2	32

Greatest number of cows is 7.

5.

Motorcycle	57	114	171	228	256.5
Bicycle	10	20	30	40	45

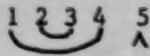
Hint: $\frac{1}{2}$ of 57 is used in the last frame because 45 is half way between 40 and 50. The motorcycle will travel 256.5 km.

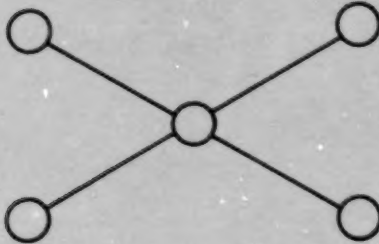
6.

<u>Number of Nickels</u>	<u>Number of Dimes</u>
1	5
3	4
5	3
7	2
9	1

PROBLEM SOLVING SHEET 5.8ANSWERS AND SELECTED SOLUTIONS1. HINT:

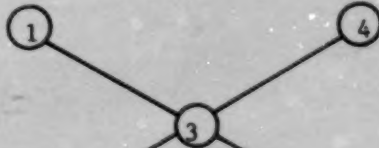
Solve a simple problem = Using digits 1-5 so that sum of each line equals the same number.

1 2 3 4 5




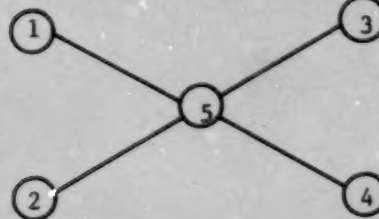
There are three possibilities:

A)



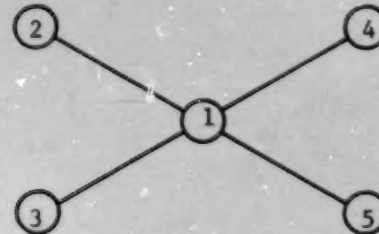
Sums are 9.

B)



Sums are 10.

C)



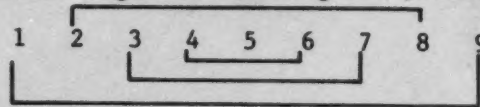
Sums are 8.

PROBLEM SOLVING SHEET 5.8ANSWERS AND SELECTED SOLUTIONS

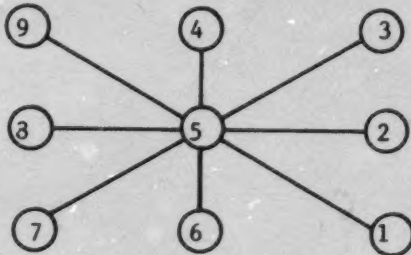
Looking at the simpler problems it can be seen that when the central number is inserted such as 3, 5, and 1, corresponding large and small digits appear on either end of the line.

e.g. In solution A, 3 is central, therefore, 1 and 5 are on one line and 2 and 4 are on the either line.

If 5 is the central digit in the original problem, then,



Sample Answer is:



2. HINT:

Solve a simpler related problem. Toss the die 10 times and multiply by 100.

Assume it appears 2 times.

ANSWER: Answers will vary but in this case it should be around 200 since.

$$\frac{2}{10} \text{ or } \frac{1}{5} \text{ of } 1000 = \underline{200}$$

Student may then test the degree of accuracy by tossing the die 100 times.

3. HINT: Solve a simpler related problem: e.g. How thick are a number of pages in your text. (Choose a measureable amount such as 200 pages). Then divide 200 by that thickness.

ANSWER: Answers will vary with books but a page would be a fraction of a millimetre such as 0.10 mm thick.

PROBLEM SOLVING SHEET 5.8ANSWERS AND SELECTED SOLUTIONS4. HINT:Simpler Related Example

If there are the same number of baskets as given, but only 9 apples in total, how many would be in each basket?

Try different number in baskets until the total is nine.

A	B	C	TOTAL
2	<u>3 x 2</u>	<u>$\frac{1}{2}$</u> (2)	<u>9</u> apples

Mr. Scott has a total of 63 apples in the three baskets. This is seven times as many as the total of 9 in our simpler related problem. Therefore, this must be seven times as many in each of Mr. Scott's baskets.

ANSWER:

$7 \times 2 = 14$	$7 \times 6 = 42$	$7 \times 1 = 7$
Basket A	Basket B	Basket C
14	42	7

Check: $14 + 42 + 7 = 63$

5. HINT:

How much gas/oil mix will be needed to fill an 85 ml container.

The rates of gas to oil is 160 units to 10 units or in simpler terms, 16 units to 1 unit.

The 85 ml tank contains 17 units or 16 units of gas to 1 unit of oil or 80 ml of gas to 5 ml of oil.

The original solution would be 10 times the simpler problem solution.

That is:

(10 x 80)ml of gas to (10 x 5)ml of oil

or

800 ml of gas to 50 ml of oil.

ANSWER:

Amount of GAS is: 800 ml

Amount of OIL is: 50 ml

PROBLEM SOLVING SHEET 5.8ANSWERS AND SELECTED SOLUTIONS6. HINT:

Solve a simpler related problem in progressive stages.

A) How many km for round trip?

$$150 \times 2 = 300 \text{ km}$$

B) How many km for a day?

$$300 \times 2 = 600 \text{ km}$$

C) How many km for the month of August?

$$600 \times 31 = 18\,600 \text{ km}$$

Answer is: 18 600 km

PROBLEM SOLVING SHEET 5.9ANSWERS AND SELECTED SOLUTIONS

1. ? is 6.25 (Work backwards)

2. HINT:

Work backwards from 20 allowing each player to lose one game.

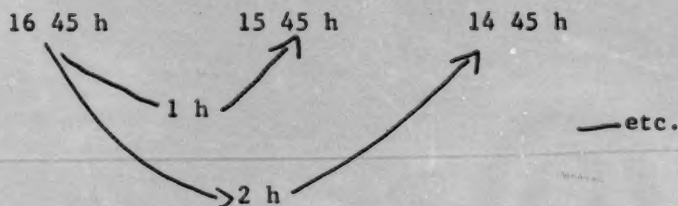
Players are numbered from 1 to 20.

Losers in each round are stroked out.

ROUND I	ROUND II	ROUND III	ROUND IV	ROUND V
10 GAMES	5 GAMES	2 GAMES	1 GAME	1 GAME
1 - 2	1 - ~~3~~	1 - ~~8~~	1 - ~~17~~	1 - ~~8~~
3 - 4	5 - ~~7~~	9 - ~~13~~	9 has a bye	
5 - ~~6~~	9 - ~~11~~	17 has a bye		
7 - ~~8~~	13 - ~~15~~			
9 - 10	17 - ~~18~~			
11 - 12				
13 - 14				
15 - 16				
17 - 18				
19 - 20				

Answer: 19 games were played to determine a champion.

3. Hint: Work backwards from 16 45 h.



Work backwards from 13 30 h in a similar manner.

To go from Winnipeg to Souris, Barry will leave at 10 30 h.

To go from Souris to Russell, Barry will leave at 14 45 h.

PROBLEM SOLVING SHEET 5.9ANSWERS AND SELECTED SOLUTIONS

4. Hint: Work backwards to find how many marbles he had before gain and loss.

Number of marbles today: 25

Before the Gain : $25 - 8 = 17$

Before the Loss : $17 + 3 = 20$ Marbles

Initial number of marbles is: $20 \times 5 = 100$

Answer: 100 Marbles.

5. Solution:

	Mary	Bill
Dec. 1	\$72.00	\$72.00
Nov. 1	\$68.00	\$67.00
Oct. 1	\$64.00	\$62.00
Sept. 1	\$60.00	\$57.00
Aug. 1	\$56.00	\$52.00
July 1	\$52.00	\$47.00
June 1	\$48.00	\$42.00
May 1	\$44.00	\$37.00

Mary had \$44.00 and Bill had \$37.00 before making their deposits on June 1.

6. Hint: Work backwards from the final day.

Answer is: 34 676.4 km

PROBLEM SOLVING SHEET 5.10ANSWERS AND SELECTED SOLUTIONS

1. 123 102 120
 132 103 130
 213 201 210
 231 203 230
 312 301 310
 321 302 320

There are 18 3-digit numbers.

2. 16 41 66
 21 46 71
 26 51 76
 31 56 81
 36 61 86

There are 15 numbers.

3.

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Persons:	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39

There were $1 + 3 + 5 + 7 + 9 + \dots + 37 + 39 = 400$ students who attended the circus.

Answer is: 400 students.

4. Answer is: * is 2 $\square$ is 4

5. Answer is: 13 years old.

6. Area of rectangle is: $40 \times 20 = 800 \text{ cm}^2$
 Area of cards is: $8 \times 4 = 32 \text{ cm}^2$
 Number of card is: $800 \div 32 = 25$
 Answer is: 25 cards

ASSORTED PROBLEMS

GRADE 5

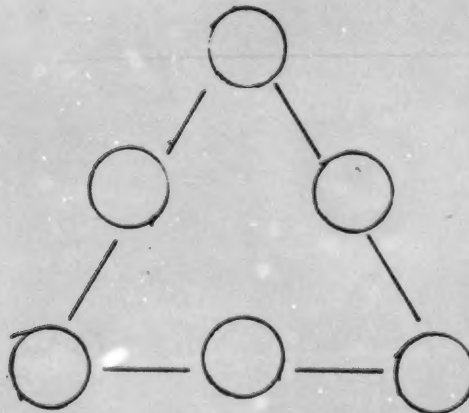
ASSORTED PROBLEMS

1. The new jet airplanes have a no smoking section in rows 14 to 34 inclusive. There are seven seats in each row. How many no smoking seats are there?
2. Suzie built a square fenced enclosure for her two sheep. There are 5 fence posts on each side. How many posts did she use altogether?
3. The difference between two numbers is 30 and their product is 1000. Find the two numbers?
4. Find the number if:
 - The tens digit is twice the ones digit
 - The tens digit is three times the hundreds digit
 - The thousands digit is 2 times the hundreds digit
 - The sum of the digits is 15
5. Study the following pattern:



If this pattern continues, how many dots will there be in the 8th circle?

6. Put $\frac{1}{10}$, $\frac{2}{10}$, $\frac{3}{10}$, $\frac{4}{10}$, $\frac{5}{10}$ and $\frac{6}{10}$ into the circles of the triangle below so that the sum of the 3 fractions on each side of the triangle is $\frac{9}{10}$.



ASSORTED PROBLEMS

7. All even numbers greater than 2 may be expressed as the sum of two prime numbers. Test this with the following numbers

a) 12 ____

b) 24 ____

c) 38 ____

How many different sums using a combination of two prime numbers can you find that will add up to:

d) 68 ____

e) 100 ____

8. A new jet airplane holds 140 passengers. If $\frac{9}{12}$ of the seats are taken, how many seats are still available?

9. Three grade 5 students found that the product of their ages was 1716. What were their ages?

10. Judy was training for a 58 km marathon. Her training schedule was set up in the following manner:

MONTH 1 - 4 km 5 times per week

MONTH 2 - 8 km 5 times per week

MONTH 3 - 14 km 5 times per week

MONTH 4 - 22 km 5 times per week

If this pattern continues how many months would it take for Judy to start running 58 km?

11. What number taken twice is 4 fewer than 6 fewer than 26?
12. What fraction of the numbers between 1 and 30, not including 7, are prime numbers?
13. Jennifer, Shannon, Cory, and Jay played chess in a tournament. If each played each other once, how many games were played in all?

ASSORTED PROBLEMS

14. What is $\boxed{?}$:

$$\boxed{\begin{array}{c} \times + \times \end{array}} = 16$$

$$\boxed{\begin{array}{c} \diamond + \diamond + \diamond + \times + \times \end{array}} = 25$$

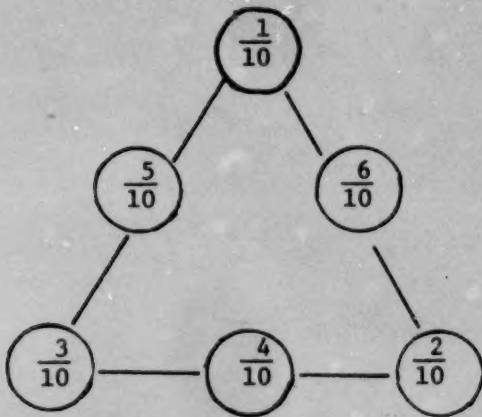
$$\boxed{\begin{array}{c} \diamond + \diamond + \diamond + \times + \times + \times \end{array}} = \boxed{?}$$

15. At a recent concert, Raffi performed for the children and their parents. Tickets for the concert were \$4.50 for adults and \$3.00 for children. If one hundred people attended the concert and \$360.00 was collected how many children paid to see Raffi?
16. Four high school friends; Peter, Sara, Neil, and Jayne are members of the St. James Collegiate stage band. Using the clue below, tell what instrument each student plays? Assume that each person plays one instrument only.
- Peter's best friend plays the bass
 - Neil and Jayne have never played the piano
 - Sara plays the guitar
 - Jayne used to play the drums but she gave them up.
17. The ice machine at the "Lazy U" Motel makes 158 ice cubes every hour. How many cubes does it make in 1 week? How many cubes in the month of September?
18. $\frac{1}{7}$ of a pizza costs \$0.63. What is the cost of 3 pizzas?

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

1. There 147 no smoking seats.
2. HINT: Make a Diagram. Answer is 16 fence posts.
3. Answer is: 50 and 20.
4. Answer is: 4263.
5. Answer is: 128 dots

6.



7. Some possible answers are:

- a) $7 + 5$
- b) $19 + 5$ or $17 + 7$
- c) $31 + 7$
- d) $61 + 7$ or $31 + 37$
- e) $97 + 3$
 $11 + 89$
 $83 + 17$

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

8. Answer is: $\frac{1}{4} \times 140 = 35$ seats
9. Answer is: 11, 12 and 13.
10. Answer is: 7 months
11. Answer is: 8
12. HINT: Between 1 and 30 do not include 7
Answer is: $\frac{9}{27}$ or $\frac{1}{3}$
13. Answer is: 6 games
14. Answer is: 33
15. Answer is: 60 children
16. Answer is: Peter plays piano
Sara plays guitar
Neil plays drums
Jayne plays bass
17. Answers are: 26 544 ice cubes per week
113 760 ice cubes in the month of September
18. Answer is: \$13.23

PROBLEM SOLVING SHEETS

GRADE 6

CURRICULUM CHART: GRADE 6

CURRICULUM TOPICS									STRATEGIES										
PROBLEM SHEETS		Whole Number Operations and Place Value	Estimating and Rounding Off	Patterns	Fractions	Decimals	Graphing	Measurement	Geometry	Guess & Check	Look for a Pattern	Act it Out	Diagram (Draw/Graph)	Write a Number Sentence	Make a Model	Make a Table	Solve a Simpler Problem	Work Backwards	Account for all Possibilities
6.1	o	o				o				6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	6.10
6.2	o		o							x			v	v	v		v		
6.3	o									v	x		v		v	v			
6.4	o				o	o	o	o	o	v	v	x	v		v	v		v	
6.5		o			o	o		o		v		v	x		v	v			
6.6	o					o		o	o	v			v	x			v		
6.7	o		o							v	v	v	v		x	v			
6.8	o		o	o	o			o	o	v		v	v	v		x	v		v
6.9	o				o			o		v			v	v			x		
6.10	o		o	o				o	o	v	v	v	v	v	v	v	v	x	
										v	v	v	v	v	v				x

o - curriculum topic
 x - key strategy
 v - alternative strategy

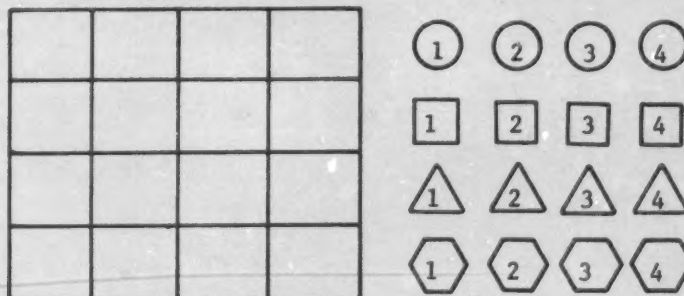
18 Assorted Problems

PROBLEM SOLVING SHEET 6.1GUESS AND CHECK

1. It costs 18¢ to mail a postcard and 30¢ for a letter. Mary told me she wrote to 16 friends and spent \$4.08 for postage. How many letters and how many postcards did she write?
2. Numbers like 1, 2, 3, 4, ... are consecutive. The sum of 3 consecutive numbers is 189. What are these numbers?
3. Use multiples of 3 to make number sentences using the model below. How many can you make?

$$\boxed{} \times \boxed{} \div \boxed{} = \boxed{}$$

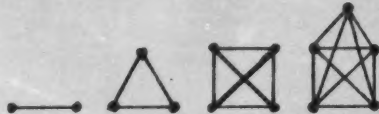
4. Rae is 5 years older than Kevin. In 3 years, she will be twice as old as Kevin. How old is Kevin now?
5. Bob was given the 16 pieces (shown below) to place on the grid. He could not place 2 pieces of either the same shape or the same number along any column or row. Copy the grid and cut out the pieces to show how Bob might place the pieces on the grid.



6. Miss Lang listed the first 12 prime numbers on the board. They are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37. She asked the class to choose 5 consecutive prime numbers whose product is 85 085. What numbers did the class choose?

PROBLEM SOLVING SHEET 6.2LOOK FOR A PATTERN

1. The number of line segments joining a set of points increases as the number of points increases. Find how many line segments there will be when there are 8 points; 10 points.



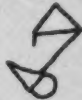
2.



For the hexagon with 42 dots, how many dots are on each side?

3. Look for a common element in each of the following.

This is a RUMDA.



This is a RUMDA.



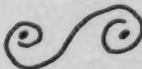
This is a RUMDA.



This is not a RUMDA.



This is not a RUMDA.



Is this a RUMDA? (A)?



Is this a RUMDA? (B)?



4. a) What is the last digit of 2^9 ?
 b) What is the digit in the one thousand's place in 2^{10} expressed in standard form?

PROBLEM SOLVING SHEET 6.2LOOK FOR A PATTERN

5. Using the pattern predict the sum of 7 terms.

$$\frac{1}{2} + \frac{1}{2^2} = \frac{3}{4}$$

$$\frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} = \frac{7}{8}$$

$$\frac{1}{2} + \frac{1}{2} + \frac{1}{2^3} + \frac{1}{2^4} = \frac{15}{16}$$

Find $\frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \frac{1}{2^4} + \frac{1}{2^5} + \frac{1}{2^6} + \frac{1}{2^7} =$

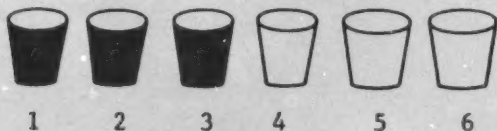
6. If the figure below is continued, how many letters will be in the J row?

A
BBB
CCCCC
DDDDDD

Which row will contain 27 letters?

PROBLEM SOLVING SHEET 6.3ACT IT OUT

1. At the Glenboro Chamber of Commerce meeting, 45 handshakes were exchanged. Everyone shook hands once with everyone else. How many people were at the meeting?
2. By moving 1 glass only, line up glasses so that the full and empty glasses are in a full, empty, full, empty order.



3. Arrange 3 piles of objects, so that there are 5 objects in Pile I, 6 objects in Pile II, and 10 objects in Pile III. In 3 moves see if you can have 7 objects in each pile. Rule: One may move only one object at a time.
4. Loop the ends of a piece of yarn over a pair of scissors and make a cut as shown below. How many pieces are formed? Wrap another loop over the scissors and make a cut. How many pieces are formed? How many pieces are made when the loop is wrapped 12 times around the scissors and a cut is made?



once over scissors



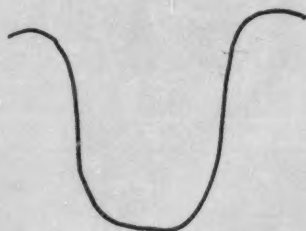
twice over scissors



three times over scissors

PROBLEM SOLVING SHEET 6.3ACT IT OUT

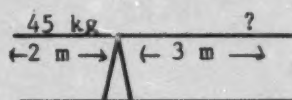
5. A piece of yarn is laid out in the shape of a U. Make 2 parallel horizontal lines across the U using pieces of string. How many separate pieces of the U will there be? How many pieces will there be with 5 parallel lines? With 8? With 12?



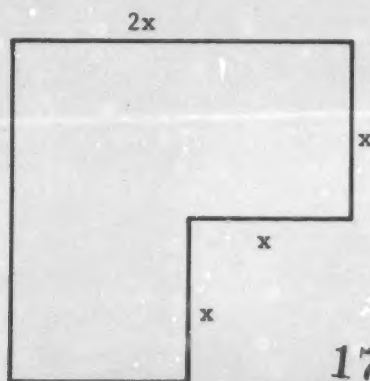
6. At the Christmas party, Mrs. Tennyson's class exchanged gifts. If each student gives a gift to each of the other students in the class and there are 22 students, what is the total number of gifts exchanged?

PROBLEM SOLVING SHEET 6.4DIAGRAM (DRAW/GRAPH)

1. Wesley fenced a square piece of land. There are 9 posts on each side. How many posts did he use altogether?
2. A seesaw is balanced. What would the weight of a person on the right, 3 metres from the fulcrum, be if the person on the left weighs 45 kg and is 2 metres from the fulcrum?

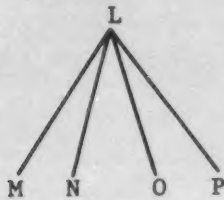


3. A rubber ball is dropped from a height of 10 m on the asphalt. The ball bounces 8 m on the first bounce, 6.4 m on the second bounce. Each bounce is eight-tenths as high as the previous bounce. Make a table and bar graph to show the height of each bounce for the first 8 bounces. Round your answer off to the nearest tenth. What is the number of the first bounce which has a height less than 3m?
4. The gym teacher in Thompson received a shipment of new physical education equipment in identical boxes. One box was labelled footballs; another was labelled volleyballs and a third was labelled footballs and volleyballs. The labels on the boxes are mixed and not one is correct. How can the physical education teacher label correctly the boxes by taking one ball from one box at a time?
5. In New France during the time of the Seigneurial System, a habitant divided his land among his 4 sons. The shape and amount of each son's piece of land were identical. How can this be done using the clues shown in the diagram.



PROBLEM SOLVING SHEET 6.4DIAGRAM (DRAW/GRAPH)

6. There are 5 finalists L, M, N, O, P in a frisbee contest. Complete the tree diagram to show all the ways the five finalists can be awarded 1st and 2nd prizes.



PROBLEM SOLVING SHEET 6.5WRITE A NUMBER SENTENCE

1. A dog ate 60 kg of food in 40 weeks. How much did the dog eat per week?
2. One hundred seventy-five pages of a book are 0.8 cm thick. How thick are 525 pages of the same book? Round off your answer to the nearest tenth.
3. Researchers have discovered that there is a male and female "growth factor" which if multiplied by present height will produce an approximate adult height.

Growth Factors (in cm)		
<u>Females</u>	<u>Males</u>	<u>Age</u>
1.19	1.82	10
1.14	1.23	11
1.07	1.19	12
1.03	1.15	13
1.02	1.10	14
1.01	1.05	15

e.g. An 11 year old girl's growth factor is 1.14 cm.

Problem

- A. Scott is 140.5 cm tall and is 12 years old. What would his approximate adult height be?
 - B. What would your own approximate adult height be?
-
4. How long does it take a puck moving at 50 m per second to travel 30 m.
 5. If Roberta cuts 7.50 m of ribbon into pieces each 0.75 m long, how many pieces will she have?
 6. At 100 km per hour, how many metres does a car travel in $\frac{1}{2}$ hour?
in $\frac{1}{3}$ hour?

PROBLEM SOLVING SHEET 6.6MAKE A MODEL

1. At Lakewood School's tenth anniversary tea, pictures showing the school's history were hung on the wall. Six (3 cm x 5 cm) pictures were to be arranged in a 22 cm x 25 cm frame so that the distance between pictures was the same as the distance from the edges. Show the layout.
2. A die is in a "frame" formed by 4 straws. (see below). Try to get the die out of the frame by moving 2 straws to retain a congruent "frame" - but in a new position.

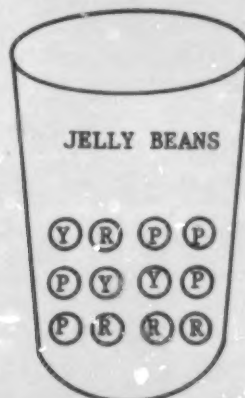


3. If the area of a decagon (10-sided shape) is 7.50 cm^2 , what is the area of $\frac{1}{10}$ of this symmetric shape?
4. Plot 4 polygons on a cartesian graph.
 - 1) (1,8) (4,10) (7,9) (8,6) (5,4) (2,5)
 - 2) (2,2) (7,4) (9,1)
 - 3) (10,7) (9,10) (12,12) (15,10) (14,7)
 - 4) (12,6) (15,3) (12,0) (9,3)

Double the co-ordinates of the vertices of each polygon and plot on the graph. Compare the old and new polygons for size and area.
5. Trudy and Ross spent Saturday unloading crates of oranges from a truck. Each crate was 66 cm long, 43 cm wide and 32 cm high. They unloaded 42 crates. What was the total volume of the crates?
6. Ivy put a string around the edge of her garden. The rectangular shaped garden is 7.38 m long and 5.25 m wide. What is the area of Ivy's garden? What is the length of the string around Ivy's garden?

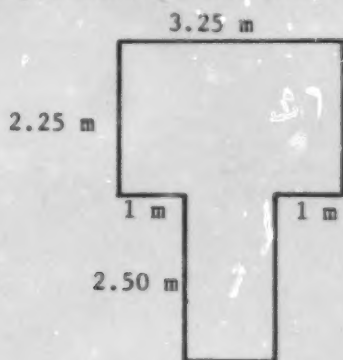
PROBLEM SOLVING SHEET 6.7MAKE A TABLE

1. Marla, Lynn, Lisa and Jackie formed a Neepawa Women's Coffee Club, which is to have a president and vice-president. Each year the officers change until every possible combination of president and vice-president has been established. For how many years can they have a different combination if the 4 women are the only members of the club, and will serve each office only once?
2. Karen is 3 times as old as Allan. In 6 years from now, Karen will be two times as old as Allan. How old will Karen be six years from now?
3. Each time 2 dice are rolled, 2 numbers land facing up.
 - A) How many different combinations of numbers can there be?
 Hint: Only count different sets of numbers. Example: 1, 3 and 3, 1 are the same.
 - B) How many different products can there be?
4. In how many ways can you put 8 tennis balls in 2 pails?
5. The cook, waiter and waitress in a restaurant are named Bob Cook, Kerry Waiter, and Lori Waitress.
 Match each person with his/her job, using the following clues:
 - No person holds a job which is his/her last name.
 - Kerry is not the cook.
6. There are 3 yellow, 4 red and 5 purple jelly beans in a jar. If you were blindfolded how many jelly beans would you have to take out of the jar to make sure you had removed 2 of the same colour?



PROBLEM SOLVING SHEET 6.8SOLVE A SIMPLER PROBLEM

1. During the year Denise scored a total of 713.25 points on 9 of her grade six math tests. What was her average test mark?
2. A tree 3 m tall grew to 2.8 times its height in 53 years. How tall did the tree grow?
3. Bert had $\frac{3}{10}$ of a flower pot of peat moss. He put $\frac{1}{3}$ of the peat moss in another pot. The pots were the same size. What part of the second pot did he fill with moss?
4. Rearrange 6 different digits to name the 6 largest numbers possible. You may use each digit only once in each number. What is the sum of the 6 addends?
5. The grade six class dug a hole in the courtyard to install a fresh water pond. The hole is 0.50 m deep and according to the dimensions of the diagram below.
 - a) What is the area of the bottom of the pond?
 - b) What is the volume of the pond?
 - c) What is the perimeter of the pond?



6. Tom's mother bought 3 kg of bananas at 2 kg for \$1.79. If the peel of a banana weighs about .125 of the total mass of the banana, about how much did she pay for the banana peels?

PROBLEM SOLVING SHEET 6.9WORK BACKWARDS

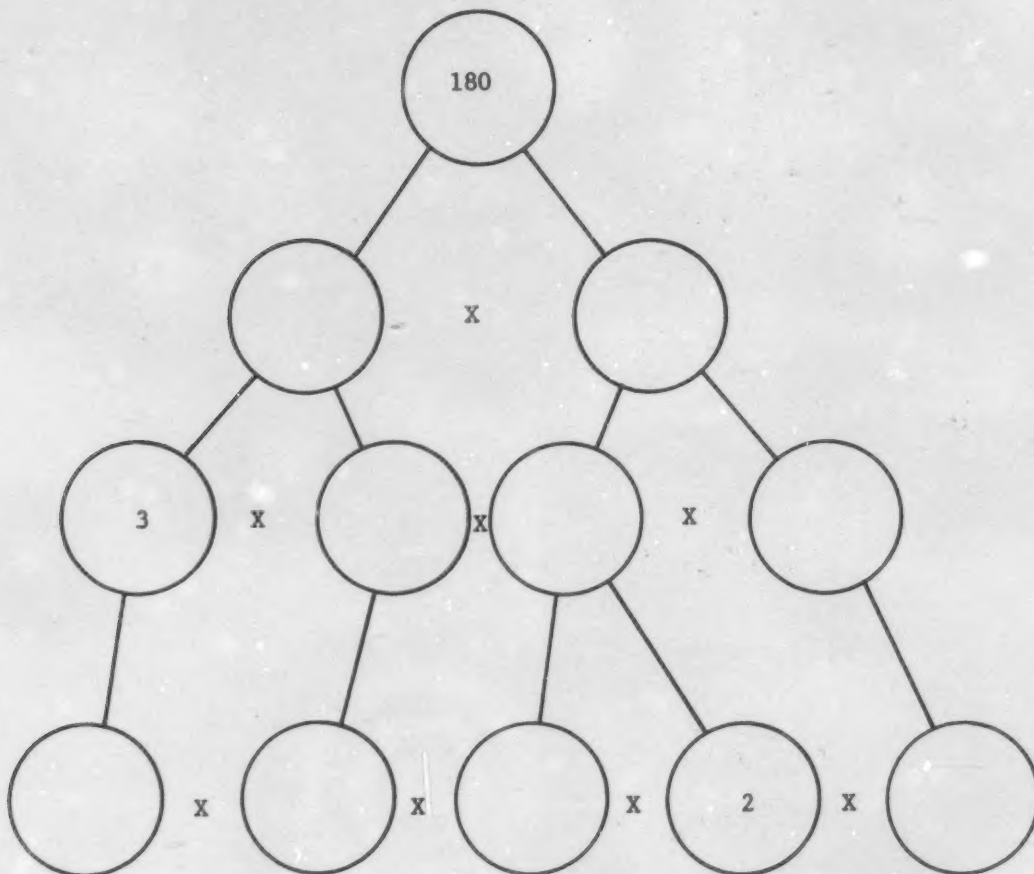
1. The "Crazy Crawler" weed doubles in water every 24 hours. If there is 1 Crazy Crawler in Lake Manitoba on May 21 and the lake is completely covered with weeds 45 days later, on which day was the lake half covered with weeds?
2. Dick and Jane each have \$108.00 in their bank accounts after making their deposits on December 31. If Jane deposited \$9.00 and Dick \$7.00 on each Friday in the preceding months, how much did each have before making their deposit on October 29? (Use the calendar below.)

OCTOBER							NOVEMBER							DECEMBER						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
					1	2	1	2	3	4	5	6				1	2	3	4	
3	4	5	6	7	8	9	7	8	9	10	11	12	13	5	6	7	8	9	10	11
10	11	12	13	14	15	16	14	15	16	17	18	19	20	12	13	14	15	16	17	18
17	18	19	20	21	22	23	21	22	23	24	25	26	27	19	20	21	22	23	24	25
24	25	26	27	28	29	30	28	29	30					26	27	28	29	30	31	
31																				

3. John left for school in the morning. The school was 1 km away from his house. When he had walked 250 m he passed the town hall and the clock there read 08 40 h. When he had gone 500 m the clock at the jewellery store read 08 47 h. If he arrived at school at 09 01 h, what time was it when he had walked 750 m? How many minutes did it take John to walk 250 m? (Assume that John's walking pace is constant.)
4. Lindsay checked the clock upon her arrival at Winnipeg International Airport and noted she had one hour wait until flight time. An announcement was made that there would be a 2 hour delay in her flight. A further delay of $1\frac{1}{2}$ hours was announced. If her flight left at 22 00 h, what time did Lindsay arrive at the airport?

PROBLEM SOLVING SHEET 6.9WORKING BACKWARDS

5. Copy and complete the factor tree.



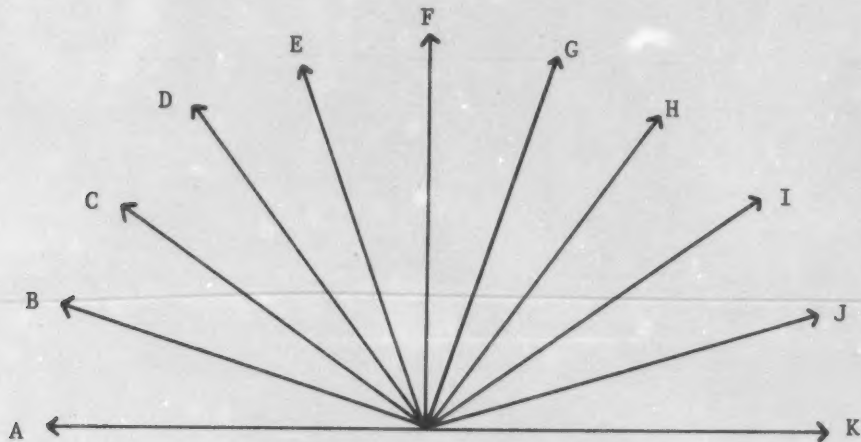
PROBLEM SOLVING SHEET 6.9WORKING BACKWARDS

6. Marni kept a record for each month's change in her weight after she began her diet on September 30. Her weight in May was 40 kg. Using Marni's weight change record, and indicate her weight on September 30.

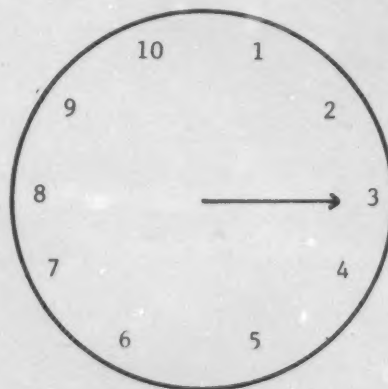
Oct.	3
Nov.	-4
Dec.	2
Jan.	-3
Feb.	1
Mar.	-2
Apr.	5
May	-4

PROBLEM SOLVING SHEET 6.10ACCOUNT FOR ALL POSSIBILITIES

- Two strings 18m and 24m in length need to be cut into pieces which are all the same length. What is the greatest length the pieces can be?
- How many angles are formed by 11 rays with a common vertex?



- Complete the probability chart for the outcome of each spinner result. Assume the spinner always stops on a number. Record the percentages.



Spinner Lands On:	Probability	Per Cent
... number 5		
... an even number		
... either 6 or 10		
... a number less than 9		

PROBLEM SOLVING SHEET 6.10ACCOUNT FOR ALL POSSIBILITIES

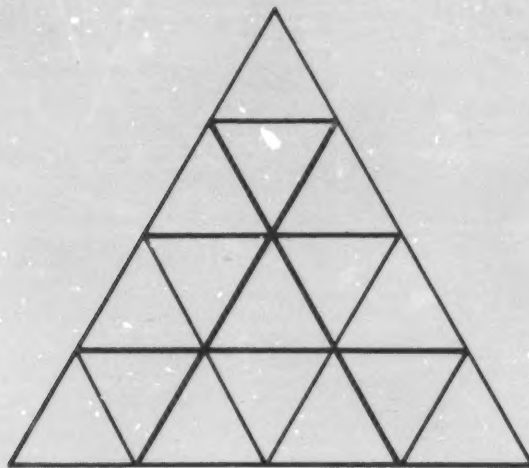
4. Susan forgot to use four addition signs when she wrote this mathematical sentence. See if you can insert them in the correct places without moving any of the digits to make this sentence true.

$$1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad = \quad 100$$

5. Play "Four Square" by using exactly four 4's in each mathematical sentence and the following signs only: +, -, x, ÷, (). Rename the whole numbers 1 through 5 like this.

Example: $0 = (4 \div 4) - (4 \div 4)$ or $(4 + 4) - (4 + 4)$

6. Doug arranged his triangular glass mobiles into this figure.
How many triangular shapes were there?



PROBLEM SOLVING SHEET 6.1ANSWERS AND SELECTED SOLUTIONS

1.

Letters				Postcards			Totals	
7	30¢	\$2.10		9	18¢	\$1.62	\$3.72	Too low
8	30¢	\$2.40		8	18¢	\$1.44	\$3.84	Too low
12	30¢	\$3.60		4	18¢	\$0.72	\$4.32	Too high
10	30¢	\$3.00		6	18¢	\$1.08	\$4.08	**

Answer is: 10 letters and 6 postcards.

2. Trial 1:

$$189 \div 3 = 63$$

A smaller number is needed.

Trial 2:

$$60 + 61 + 62 = 183$$

Since $183 < 189$ the first consecutive number should be between 63 and 60.

Trial 3:

$$62 + 63 + 64 = 189$$

The numbers are : 62, 63, 64.

3. Some answers are:

6	6	12	3
18	6	9	12
36	3	9	12

PROBLEM SOLVING SHEET 6.1ANSWERS AND SELECTED SOLUTIONS

4. Trial 1:

Try Kevin's age as 1

$$\begin{array}{r} \text{Kevin's age is } 1 \\ + 3 \\ \hline 4 \end{array}$$

$$\begin{array}{r} \text{Rae's age is } 6 \\ + 3 \\ \hline 9 \end{array}$$

Age in 3 years is 4

Age in 3 years is 9

Since 9 is not twice 4, Kevin's age is not 1.

Trial 2:

$$\begin{array}{r} \text{Kevin's age is } 2 \\ + 3 \\ \hline 5 \end{array}$$

$$\begin{array}{r} \text{Rae's age is } 7 \\ + 3 \\ \hline 10 \end{array}$$

Kevin is 2 years old now.

5. Hint: Arrange one of the variables (i.e. shape or numbers) first and then proceed with the second.

Answer is:

2	1	3	4
4	3	1	2
1	2	4	3
3	4	2	1

6. Trial 1:

$$2 \times 3 \times 5 \times 7 \times 11 = 2310 \text{ (Too low)}$$

Trial 2:

$$7 \times 11 \times 13 \times 17 \times 19 = 323\,323 \text{ (Too high)}$$

Trial 3:

$$5 \times 7 \times 11 \times 13 \times 17 = 85\,085$$

Answer is: 5, 7, 11, 13, 17

PROBLEM SOLVING SHEET 6.2ANSWERS AND SELECTED SOLUTIONS1. Answer:

Number of Points	2	3	4	5	6	7	8	9	10
Number of Line Segments	1	3	6	10	15	21	28	36	45

When there are 8 points there will be 28 line segments. When there are 10 points there will be 45 line segments.

2. Answer is: 8 dots on each side.

3. A RUMDA is a figure containing a numeral excluding a 1.

A - Yes (number 5 is visible)

B - No

4. a) $2^1 = 2$

$2^2 = 4$

$2^3 = 8$

$2^4 = 16$

$2^5 = 32$

$2^6 = 64$

$2^7 = 128$

$2^8 = 256$

$2^9 = 512$

Last digit is 2

b) The digit of 2^{10} in standard form in the one thousand's place is 1.

PROBLEM SOLVING SHEET 6.2ANSWERS AND SELECTED SOLUTIONS

5. The pattern indicates that the denominator doubles and the numerator is one less than the denominator.

ANSWER IS: $\frac{127}{128}$

6. The pattern increases by consecutive odd numbers.

ANSWERS ARE:

19 letters in the J row

N row

PROBLEM SOLVING SHEET 6.3ANSWERS AND SELECTED SOLUTIONS

1. Have students act it out. Students seated could count out loud.
There are 10 people at the meeting.
2. Empty 2 into 5 and then put 2 back where it was.
3.
 1. Move 1 object from Pile III to Pile II.
 2. Move 1 object from Pile III to Pile I.
 3. Move 1 object from Pile III to Pile I.
4. Repeat diagram from question:

once over
scissors
2 pieces

twice over
scissors
3 pieces

three times over
scissors
4 pieces

When the loop is wrapped 12 times around the scissors and a cut is made, there are 13 pieces of yarn.

5. Use a piece of yarn and then string to form parallel lines.
See if students can discover a pattern by acting it out.

ANSWER IS:

<u>Parallel Lines</u>	<u>Pieces</u>
2	(5)
5	(11)
8	(17)
12	(25)

6. Have students use a model to represent a gift and act it out.
462 gifts are exchanged.

PROBLEM SOLVING SHEET 6.4ANSWERS AND SELECTED SOLUTIONS

Wesley used 32 posts altogether.

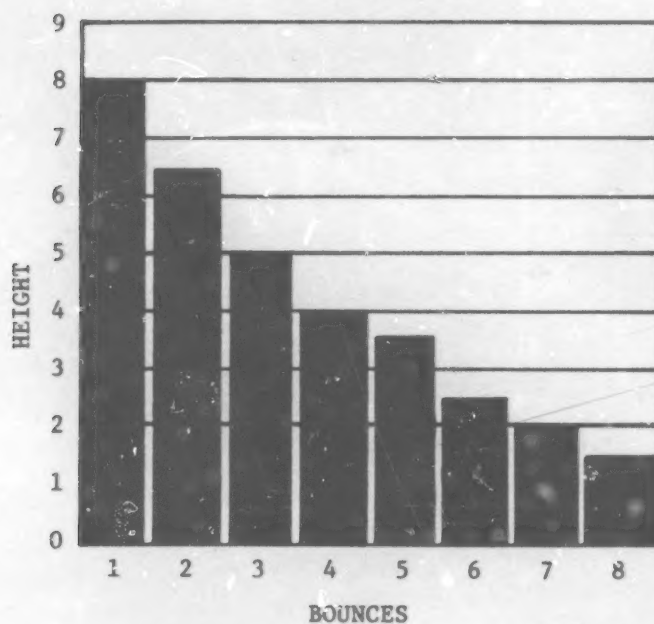
2.



The weight of the person on the right is 30 kg.

3.

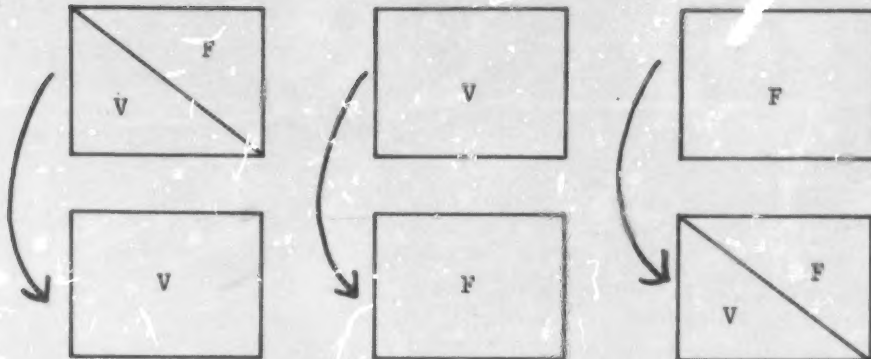
BOUNCE	1	2	3	4	5	6	7	8
HEIGHT	8	6.4	5.1	4.1	3.3	2.6	2.1	1.7

A BOUNCING BALL

Answer is: On the sixth bounce the height will be less than 3 m.

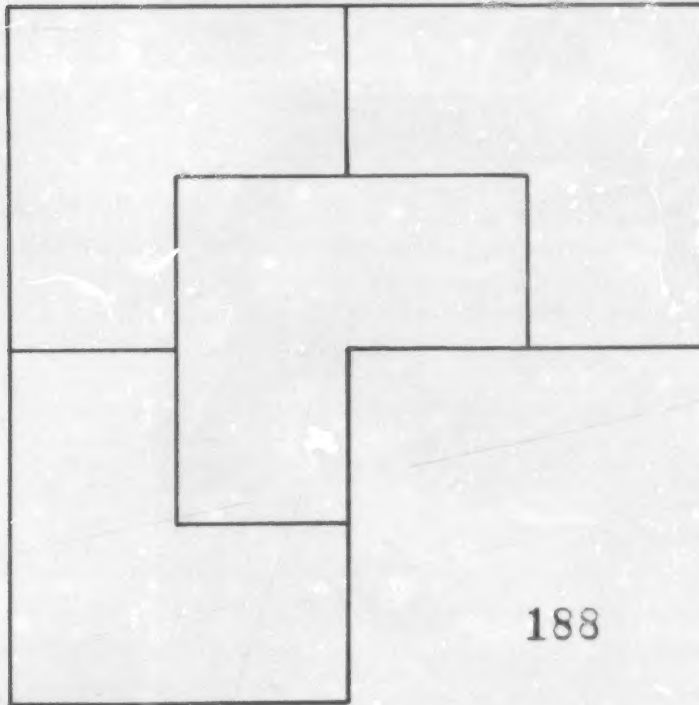
PROBLEM SOLVING SHEET 6.4ANSWERS AND SELECTED SOLUTIONS

4.



Hint: Take a ball from box labelled V/F. Since the label is wrong, the teacher knows it cannot have both. Say it is a volleyball - then the teacher knows to label the box V. Now the teacher knows football cannot be F so it must be V/F. The only label left is F.

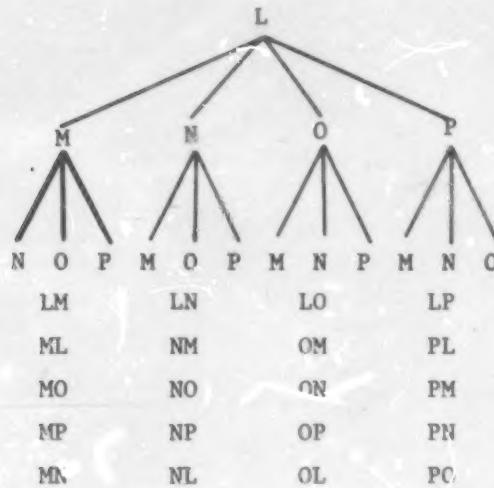
5.



PROBLEM SOLVING SHEET 6.4

ANSWERS AND SELECTED SOLUTIONS

6. ANSWER IS: There are 20 ways.



PROBLEM SOLVING SHEET 6.5ANSWERS AND SELECTED SOLUTIONS

1. $n = 60 \div 40$

$n = 1.50 \text{ kg}$

The dog ate 1.50 kg in one week.

2. $0.8 \div 175 = .0045714 \text{ cm per page}$

$.0045714 \times 525 = n$

$n = 2.39$

$n = 2.4 \text{ cm}$

525 pages of the same book are 2.4 cm thick.

3. $n = 140.5 \times 1.19$

$n = 167.195$

A) Scott will be approximately 167 cm tall as an adult.

B) Answers will vary with students present height and age.

4. $n = 30 \div 50$

$n = 0.6$

It takes the puck 0.6 seconds.

5. $n = 7.50 \div 0.75$

$n = 10$

Roberta will have 10 pieces of ribbon.

6. $1000 \text{ m} = 1 \text{ km}$

$100 \text{ km} = 100\,000 \text{ m}$

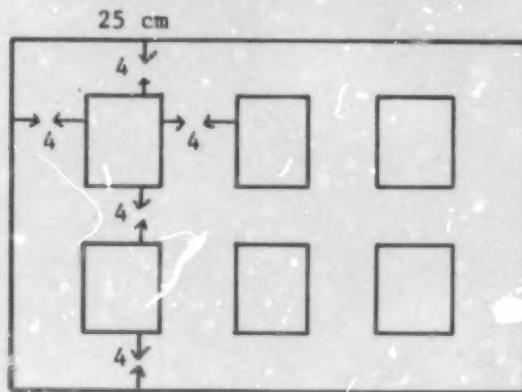
$\frac{1}{2} h = 50 \text{ km or } 50\,000 \text{ m}$

$\frac{1}{3} h = 33.33 \text{ km or } 33\,333.3 \text{ m}$

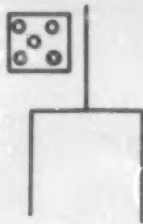
PROBLEM SOLVING SHEET 6.6ANSWERS AND SELECTED SOLUTIONS

1.

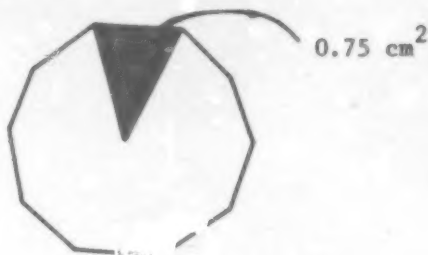
22 cm



2. Slide the horizontal straw one-half its length to the right. Then move the upper left straw to the lower right position.



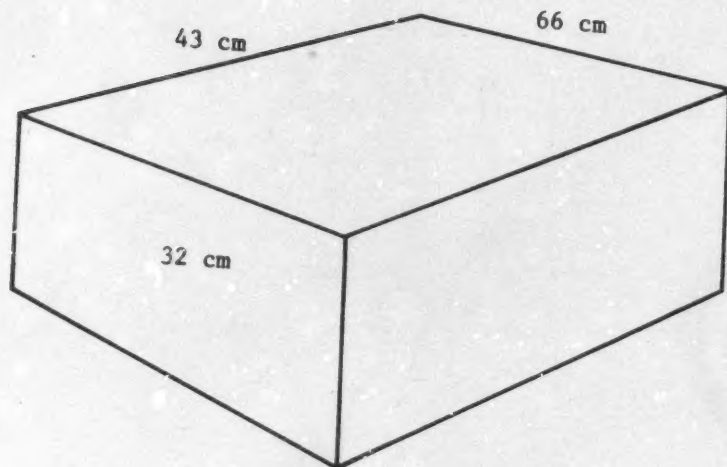
3. Answer is 0.75 cm^2



4. Use graph paper to plot the polygons. The polygons are similar in shape but have sides twice as long. The areas of the new polygons are four times as great as the areas of the old polygons.

PROBLEM SOLVING SHEET 6.6ANSWERS AND SELECTED SOLUTIONS

5.



Volume of 1 crate

$$= 66 \times 43 \times 32$$

$$= 90\,816 \text{ cm}^3$$

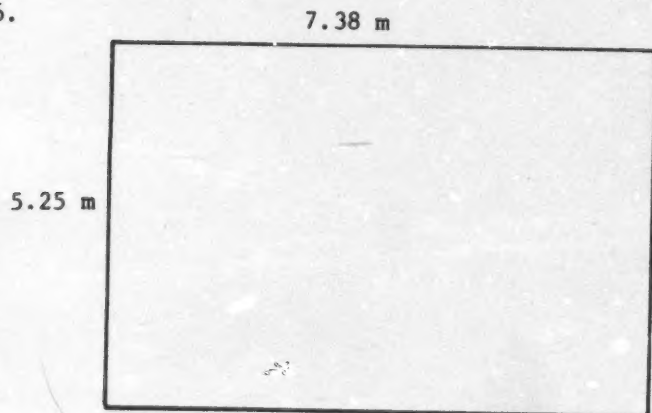
Volume fo 42 crates

$$= 90\,816 \times 42$$

$$= 3\,814\,272 \text{ cm}^3$$

The total volume is $3\,814\,272 \text{ cm}^3$

6.



Area

$$= 7.38 \times 5.25$$

$$= 38.745 \text{ m}^2$$

Perimeter

$$= 7.38 + 7.38 + 5.25 + 5.25$$

$$= 25.26 \text{ m}$$

Area of Ivy's garden is 38.745 m^2 .The length of the string around Ivy's garden is 25.26 m .

PROBLEM SOLVING SHEET 6.7ANSWERS AND SELECTED SOLUTIONS

1. Table all combinations

PRES.	V.P.
Marla	Lynn
Marla	Lisa
Marla	Jackie
Lynn	Lisa
Lynn	Jackie
Lynn	Marla
Lisa	Jackie
Lisa	Marla
Lisa	Lynn
Jackie	Marla
Jackie	Lynn
Jackie	Lisa

Answer is: 12 years

- 2.

Allan		Karen	
Age	+6	Age	+6
1	7	3	9
2	8	6	12
3	9	9	15
4	10	12	18
5	11	15	21
6	12	18	(24)

Answer is: When Karen is (24) years old,
six years hence she will be
twice as old as Allan.

Answer is: (24) years

PROBLEM SOLVING SHEET 6.7ANSWERS AND SELECTED SOLUTIONS

3. PA - Pair

PR - Product

PA	PR	PA	PR	PA	PR	PA	PR	PA	PR	PA	PR
$\frac{1}{1}$	1	$\frac{2}{2}$	4	$\frac{3}{3}$	9	$\frac{4}{4}$	16	$\frac{5}{5}$	25	$\frac{6}{6}$	36
$\frac{1}{2}$	2	$\frac{2}{3}$	6	$\frac{3}{4}$	12	$\frac{4}{5}$	20	$\frac{5}{6}$	30		
$\frac{1}{3}$	3	$\frac{2}{4}$	8	$\frac{3}{5}$	15	$\frac{4}{6}$	24				
$\frac{1}{4}$	4	$\frac{2}{5}$	10	$\frac{3}{6}$	18						
$\frac{1}{5}$	5	$\frac{2}{6}$	12								
$\frac{1}{6}$	6										

Answer is: A) 21L) 18

4. Table are combinations

Pail A	Pail B
0	8
8	0
1	7
7	1
2	6
6	2
3	5
5	3
4	4

Answer is: There are 9 ways.

PROBLEM SOLVING SHEET 6.7ANSWERS AND SELECTED SOLUTIONS

5.

Answer	Cook	Waiter	Waitress
Bob	X	Waiter	X
Kerry	X	X	Waitress
Lori	Cook	X	X

Bob Cook is a waiter, Kerry Waiter is a waitress and Lori Waitress is a cook.

6. To ensure that 2 jelly beans are of the same colour you would have to take out 1 Red, 1 Yellow, 1 Purple, 1 of any colour jelly beans.

Answer is: 4 jelly beans

PROBLEM SOLVING SHEET 6.8ANSWERS AND SELECTED SOLUTIONS

1. Simpler Problem: $72 \div 9 = 8$

Average Mark is: $713.25 \div 9 = 79.25$

2. Simpler Problem: $3 \times 3 = 9$

Height of tree is: $2.8 \times 3 = 8.4 \text{ m}$

3. Simpler Problem: $\frac{1}{2} \times \frac{4}{1} = \frac{2}{1} = 2$

$$\frac{1}{3} \times \frac{3}{10} = \frac{3}{30} = \frac{1}{10}$$

The pot is $\frac{1}{10}$ full.

4. Students may do the question using 3 digit numbers first and then extend it to 6 digit numbers.

Answers are: 987 654

987 645

987 564

987 546

987 465

987 456

Sum is: 5 925 330

5. Answers are:

Students may solve a simpler problem first using whole numbers.

a) Area of pond: 10.4375 m^2

b) Volume of pond: 5.21875 m^3

c) Perimeter of pond: 16 m

6. Students may solve a simpler problem first using whole numbers only.

Three kg of bananas cost $\frac{\$1.79}{2} \times 3 = \$2.685$ or $\$2.69$

Answer is: Tom's mother paid $.125 \times \$2.69 = \$0.33625$

= $\$0.34$ for banana peels

PROBLEM SOLVING SHEET 6.9ANSWERS AND SELECTED SOLUTIONS

1. Begin on the 45th day. The lake was totally covered on that day. Working backwards the lake must have been at least half covered on the day before which is the 44th day.

2. Solution

DATE	DICK	JANE
December 31	\$108.00	\$108.00
24	101.00	99.00
17	94.00	90.00
10	87.00	81.00
3	80.00	72.00
November 26	73.00	63.00
19	66.00	54.00
12	59.00	45.00
5	52.00	36.00
October 29	45.00	27.00
22	38.00	18.00

Jane had \$18.00 and Dick had \$38.00 before making deposits on October 29.

3. Hint: Work backwards from 9 01 h.

1km	750m	500m	250m
09 01h		08 47h	08 40h
	14 min.		7 min.

John had walked 750m at 08 54 h.

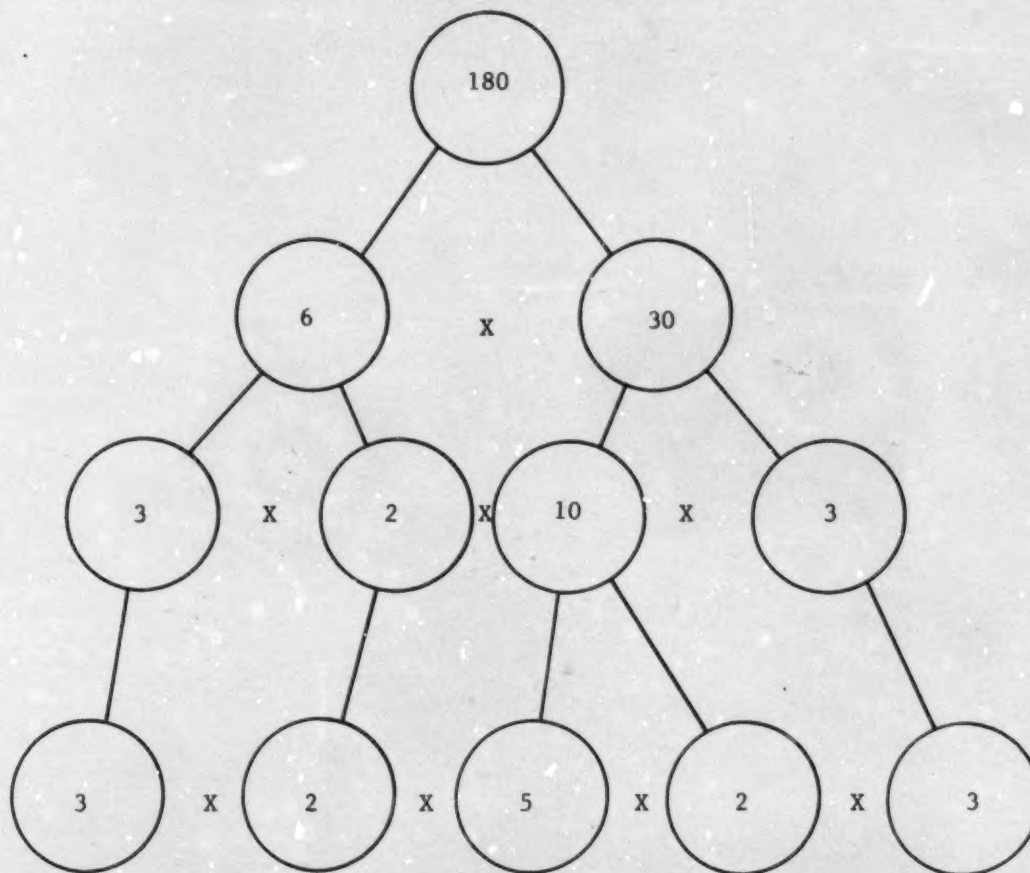
It took John 7 minutes to walk 250 m.

PROBLEM SOLVING SHEET 6.9ANSWERS AND SELECTED SOLUTIONS

4. 22 00 Flight time
-1 30 delay
 20 30
-2 00 delay
 18 30
-1 00 wait
 17 30 Arrival at airport

Lindsay arrived at the airport at 17 30 h.

5. Solution:



PROBLEM SOLVING SHEET 6.9ANSWERS AND SELECTED SOLUTIONS

H. Solution:

Month	Gain/Loss	Weight
Sept.		42
Oct.	3	45
Nov.	-4	41
Dec.	2	43
Jan.	-3	40
Feb.	1	41
Mar.	-2	39
Apr.	5	44
May	-4	40

Marni's weight on September 30 is 42 kg.

PROBLEM SOLVING SHEET 6.10ANSWERS AND SELECTED SOLUTIONS

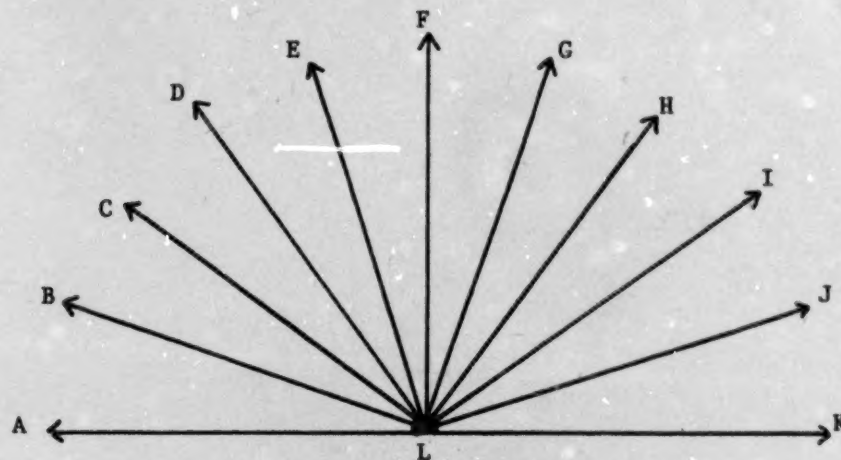
1. Factors of 18 = (1, 2, 3, 6, 9, 18)

$$24 = (1, 2, 3, 4, 6, 8, 12, 24)$$

Greatest Common Factor is 6.

The greatest length the pieces can be cut is 6 m.

2.



ALB	BLC	CLD	DLE	ELF	FLG	GLH	HLI
ALC	BLD	CLF	DLF	ELG	FLH	GLI	HIJ
ALD	BLE	CLG	DLG	ELH	FLI	GIJ	HLK
ALE	BLF	CLH	DLH	ELI	FIJ	GLK	
ALF	BLG	CLI	DLI	ELJ	FLK		
ALG	BLH	CLJ	DIJ	ELK			
ALH	BLI	CLK	DLK			ILJ	JLK
ALI	BLJ	CLK				ILK	
ALJ	BLK						
ALK							

There are 55 angles.

3.

Spinner Lands On...	Probability	Per Cent
... number 5	$\frac{1}{10}$	10%
... an even number	$\frac{5}{10}$	50%
... either 6 or 10	$\frac{2}{10}$	20%
... a number less than 9	$\frac{8}{10}$	80%

PROBLEM SOLVING SHEET 6.10ANSWERS AND SELECTED SOLUTIONS

4. Solution

$$1 + 23 + 4 + 5 + 67 = 100$$

5. Possible Solutions:

$$1 = (4 \div 4) \div (4 \div 4) \text{ or } (4 + 4) \div (4 + 4)$$

$$2 = (4 \div 4) + (4 \div 4) \text{ or } (4 \times 4) \div (4 + 4)$$

$$3 = (4 + 4 + 4) \div 4 \text{ or } [(4 \times 4) - 4] \div 4$$

$$4 = 4 - \frac{4 - 4}{4} \text{ or } [(4 - 4 \div 4)] + 4$$

$$5 = [(4 \times 4) + 4] \div 4 \text{ or } [(4 \times 4) + 4] \div 4$$

6. There were 27 triangular shapes.

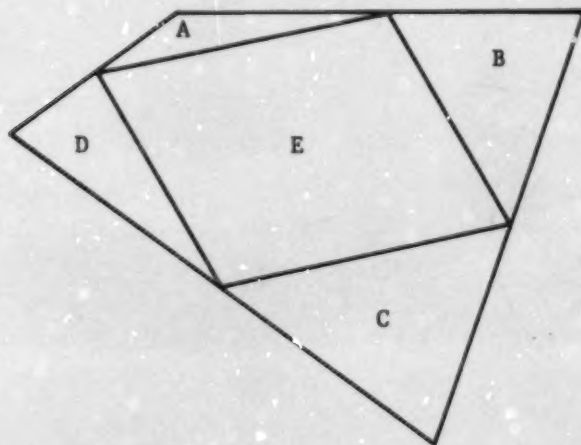
ASSORTED PROBLEMS

GRADE 6

PROBLEM SOLVING SHEET

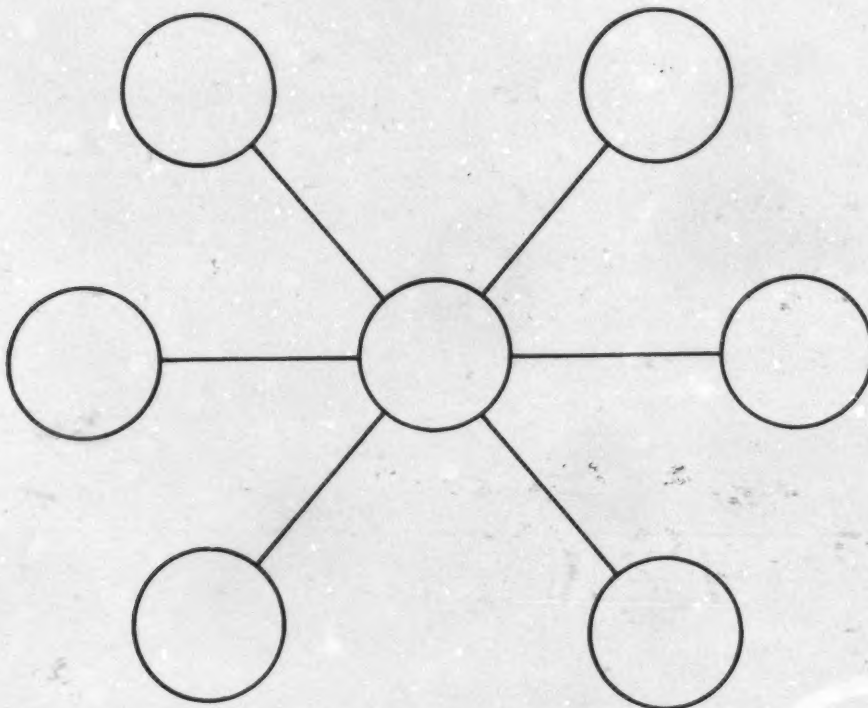
ASSORTED PROBLEMS

1. What time did the sun set when it rose at 05 12h and it was dark for 8 hours and 15 minutes?
2. The grade six class arrived at the Lower Fort Garry Information Centre at 13 30h after spending 40 minutes eating lunch at the park. They had been delayed 45 minutes while the driver changed a flat tire. The class had spent 50 minutes in the bus travelling from their school to the spot where the tire was changed and an additional 10 minutes travelling to the park. At what time did the class leave the school?
3. Complete the pattern.
 $1 \times 9 + 2 = \underline{\hspace{2cm}}$
 $12 \times 9 + 3 = \underline{\hspace{2cm}}$
 $123 \times 9 + 4 = \underline{\hspace{2cm}}$
 $\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$
 $\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{2cm}}$
4. Draw a large quadrilateral with all sides of different lengths. Connect the midpoints as shown below. Cut out the large quadrilateral and the regions A, B, C, D, and see if you can fit them together to make them congruent to quadrilateral E.

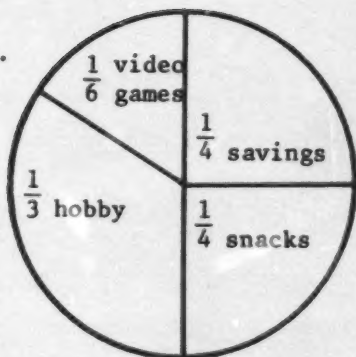


PROBLEM SOLVING SHEETASSORTED PROBLEMS

5. Find 2 numbers whose sum is 30 and whose difference is 4.
6. Make this drawing. Using the numbers 7, 8, 9, 10, 11, 12, 13 make the sum along each line equal to 30.



7.



Alfie made a report to his classmates on his budget. He used this graph to show how he spent his \$12.00 weekly paper route earnings. How much does Alfie spend on each item shown on the graph?

PROBLEM SOLVING SHEETASSORTED PROBLEMS

8. When Grandma O'Hagan makes her Chocolate Feather Cake for her and Grandpa, she cuts the recipe in half. However, when all her grandchildren come for a visit at the same time she doubles the recipe. List the amount of each ingredient she will need for each baking.

Chocolate Feather Cake

<u>half</u>	<u>single</u>	<u>double</u>
_____	225mL cake flour	_____
_____	12mL baking powder	_____
_____	1mL salt	_____
_____	50mL butter or margarine softened	_____
_____	125mL sugar	_____
_____	30g chocolate, melted	_____
_____	4 mL vanilla	_____
_____	2 eggs	_____
_____	125mL milk	_____

1. Sift flour and measure. Resift with other dry ingredients.
2. Measure butter or margarine into a mixing bowl and beat until creamy. Add sugar gradually, beating well after each addition. Stir in cool melted chocolate and vanilla.
3. Add eggs and beat until the creamed mixture is light and fluffy.
4. Add flour mixture and milk alternately to the eggs-fat mixture $\frac{1}{3}$ at a time starting and ending with the flour. Stir after each addition until the batter is smooth.
5. Place batter in a greased 2L square cake pan.
6. Bake at 180°C for 20-25 minutes.
7. Sprinkle with icing sugar and decorate with chopped nuts.

PROBLEM SOLVING SHEETASSORTED PROBLEMS

9. The Roller Derby is located on Fleecy Street. Several students live on Fleecy Street. Each student has figured the distance in kilometres he or she lives from the Roller Derby. Given the following distances east and west of the Roller Derby located at 0, figure out the distances from one student's house to another.

WEST

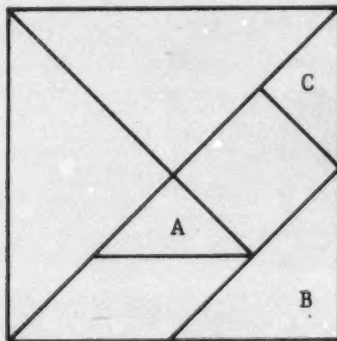
Basil .1 km
 Jack .3 km
 Kendra .5 km
 The School .8 km
 Laurie .9 km
 Bev 1.1 km
 The Pond 1.3 km

EAST

Murray .2 km
 Randy .3 km
 The Grocery Store .6 km
 Cassie .9 km
 Vic 1.5 km

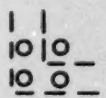
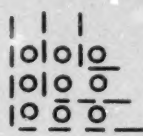
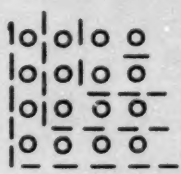
1. From Bev's to Basil's
2. From Laurie's to Murray's
3. From Bev's to Vic's

10. How many different shapes can you make using A, B, and C from this diagram. Label the shapes that you can identify.



PROBLEM SOLVING SHEETASSORTED PROBLEMS

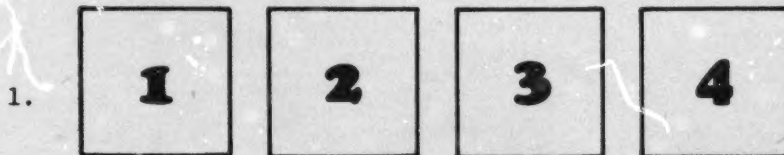
11. Using this diagram can you complete the table without drawing the fifth square?

Diagram	How Many?
	1
	$\begin{array}{r} 1 \\ +3 \\ \hline \end{array} \quad 4$
	$\begin{array}{r} 1 \\ 3 \\ +5 \\ \hline \end{array} \quad 9$
	$\begin{array}{r} 1 \\ 3 \\ 5 \\ +7 \\ \hline \end{array} \quad ?$
?	?

12. Crazy Centipede moves up the school flagpole 10 m high. Each day he climbs 3 m and each night he slips back 2 m. How many days does it take him to reach the top?

PROBLEM SOLVING SHEETSASSORTED PROBLEMS

13. Using 4 numbered cards (see below) how many different arrangements can you make? The two arrangements below are done for you.



14. An electrician has to install hanging lights along the ceiling of a gym 45 m long. He plans to install the fixtures every 2.5 m. The first fixture will be placed 2.5 m from the wall. How many fixtures will the electrician install?
15. Harry's Hamburger Haven advertises a wide assortment of hamburgers. Each one consists of a bun, one topping, and one extra. How many different choices of hamburgers are available using the following choices?

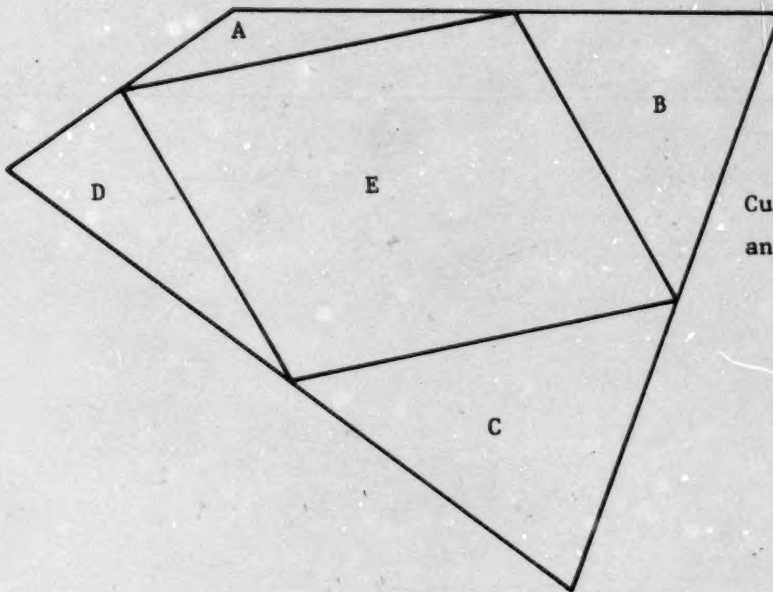
BUNS	TOPPINGS	EXTRAS
sesame	chili	pickles
Vienna	ketchup	onions
French	relish	tomatoes
cracked wheat	mayonnaise	cole slaw
pumpnickel	mustard	lettuce

PROBLEM SOLVING SHEETASSORTED PROBLEMS

16. Doug needs to measure exactly 4 litres of water into his aquarium. He has only a 5 litre container and a 3 litre container. He can fill the containers from the tap as many times as he wants. He can pour out water as many times as he wants. How can he measure out the 4 litres of water exactly?
17. Find 5 numbers to meet these conditions.
- a) The sum is 107.
 - b) Four of the numbers are even.
 - c) The third number is the sum of the first 2 numbers.
 - d) The fifth number is twice the second number.
 - e) Divide the fourth number by 4; the remainder is 3.
 - f) The third, fourth and fifth numbers are consecutive.
18. On Tuesday the roller skating rink management provided free passes for Saturday skating to a certain number of the first 100 skaters entering the rink. Each of the 100 skaters counted by ones until everyone had said a number. All the skaters who had said a multiple of 2 were eliminated. The remaining skaters counted themselves by ones and all those who had said a number which was a multiple of 3 were eliminated. The same process of elimination was used for multiples of 5 and 7. How many skaters received free passes?

ASSORTED PROBLEMS
ANSWERS AND SELECTED SOLUTIONS

1. HINT Work backwards from 05 12h by counting back 8 hours and 15 minutes.
The sun set at 20 57h.
2. They left the school at 11 05h.
3. $1 \times 9 + 2 = 11$
 $12 \times 9 + 3 = 111$
 $123 \times 9 + 4 = 1111$
 $1234 \times 9 + 5 = 11111$
 $12345 \times 9 + 6 = 111111$
4. Slide pieces B and D or (pieces A and C) to opposite sides of region E. Rotate the remaining 2 pieces to fit.



Cut out the pieces
and fit them over E.

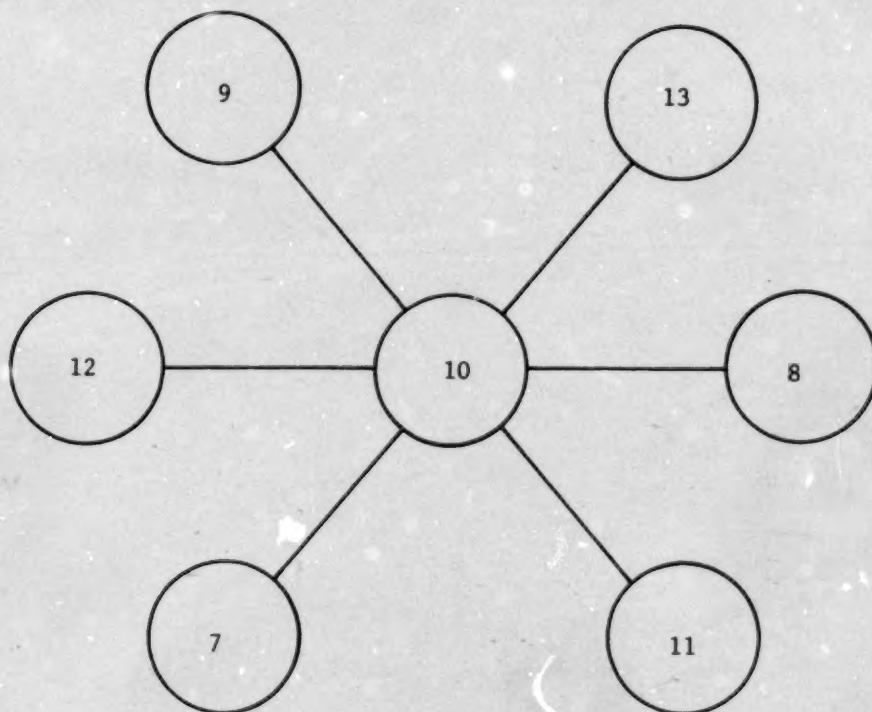
ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

5. Try $15 + 15 = 30$
 which add up to 30
 but the difference is not 4.

15	16	17
<u>+15</u>	<u>+14</u>	<u>+13</u>
Sum 30	30	30
Difference 0	2	4

Answer is: 17 and 13

6.



ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

7. Hobby: $\frac{1}{3} \times \$12.00 = \$4.00$

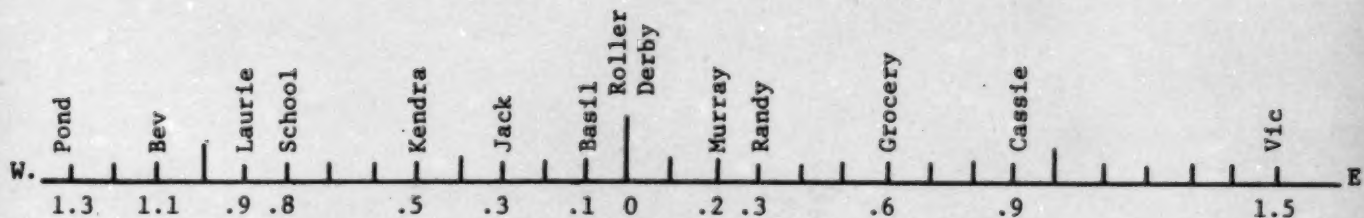
Video games: $\frac{1}{6} \times \$12.00 = \$2.00$

Savings: $\frac{1}{4} \times \$12.00 = \$3.00$

Snacks: $\frac{1}{4} \times \$12.00 = \$3.00$

8. <u>Half</u>	<u>Single</u>	<u>Double</u>
112.5	225mL cake flour	450
6	12mL baking powder	24
.5	1mL salt	2
25	50mL butter, margarine	100
62.5	125mL sugar	250
15	30g chocolate	60
2	4mL vanilla	8
1	2 eggs	4
62.5	125mL milk	250

9.



1. From Bev's to Basil's 1.0 km
2. From Laurie's to Murray's 1.1 km.
3. From Bev's to Vic's 2.6 km

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

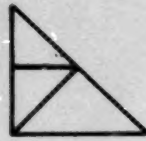
10.



Rectangular



Square



Triangle



Parallelogram



Trapezoid

There are other possibilities.

11.

Diagram	How Many?	
o	1	
<pre> o o o o - </pre>	$\begin{array}{r} 1 \\ +3 \\ \hline \end{array}$	4
<pre> o o o o o o - o o o - </pre>	$\begin{array}{r} 1 \\ 3 \\ +5 \\ \hline \end{array}$	9
<pre> o o o o o o o o - o o o o - o o o o - </pre>	$\begin{array}{r} 1 \\ 3 \\ 5 \\ +7 \\ \hline \end{array}$	16
<pre> o o o o o o o o o o - o o o o o - o o o o o - o o o o o - </pre>	$\begin{array}{r} 1 \\ 3 \\ 5 \\ 7 \\ +9 \\ \hline \end{array}$	25

The sum of the first 4 odd numbers is 16.

The sum of the first 5 odd numbers is 25.

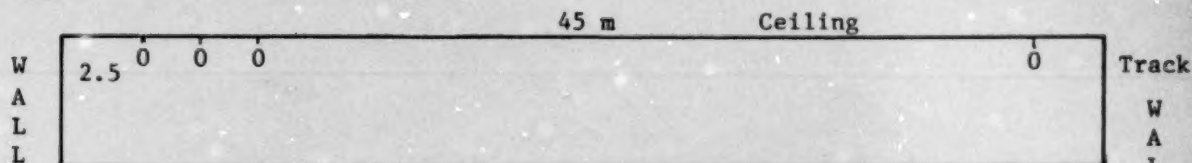
ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

12. Crazy centipede gains 1 m every 24 hours.
 After 7 days he has climbed 7 m.
 On the 8th day he climbs 3 m more to reach the top.
 Therefore it takes him 8 days.

13. There are 24 arrangements.

1 2 3 4	2 3 4 1	3 4 1 2	4 1 2 3
1 2 4 3	2 3 1 4	3 4 2 1	4 1 3 2
1 3 2 4	2 4 1 3	3 1 2 4	4 2 3 1
1 3 4 2	2 4 3 1	3 1 4 2	4 2 1 3
1 4 2 3	2 1 3 4	3 2 1 4	4 3 1 2
1 4 3 2	2 1 4 3	3 2 4 1	4 3 2 1

- 14.



Total length of track $\div$ distance between fixtures - 1 fixture
 (where track enters wall) = fixtures needed.

Answer is: $45 \div 2.5 = 18 - 1 = 17$ fixtures.

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

15. Labelling and numbering the categories make the solving easier.

BUNS	TOPPINGS	EXTRAS
1 sesame	A chili	a pickles
2 Vienna	B ketchup	b onions
3 French	C relish	c tomatoes
4 cracked wheat	D mayonnaise	d cole slaw
5 pumpernickel	E mustard	e lettuce

1 A a	2 A a	3 A a	4 A a	5 A a
1 A b	2 A b	3 A b	4 A b	5 A b
1 A c	2 A c	3 A c	4 A c	5 A c
1 A d	2 A d	3 A d	4 A d	5 A d
1 A e	2 A e	3 A e	4 A e	5 A e
1 B a	2 B a	3 B a	4 B a	5 B a
1 B b	2 B b	3 B b	4 B b	5 B b
1 B c	2 B c	3 B c	4 B c	5 B c
1 B d	2 B d	3 B d	4 B d	5 B d
1 B e	2 B e	3 B e	4 B e	5 B e
1 C a	2 C a	3 C a	4 C a	5 C a
1 C b	2 C b	3 C b	4 C b	5 C b
1 C c	2 C c	3 C c	4 C c	5 C c
1 C d	2 C d	3 C d	4 C d	5 C d
1 C e	2 C e	3 C e	4 C e	5 C e
1 D a	2 D a	3 D a	4 D a	5 D a
1 D b	2 D b	3 D b	4 D b	5 D b
1 D c	2 D c	3 D c	4 D c	5 D c
1 D d	2 D d	3 D d	4 D d	5 D d
1 D e	2 D e	3 D e	4 D e	5 D e
1 E a	2 E a	3 E a	4 E a	5 E a
1 E b	2 E b	3 E b	4 E b	5 E b
1 E c	2 E c	3 E c	4 E c	5 E c
1 E d	2 E d	3 E d	4 E d	5 E d
1 E e	2 E e	3 E e	4 E e	5 E e

There are 125
different choices
available.

ASSORTED PROBLEMSANSWERS AND SELECTED SOLUTIONS

16. Fill the 5 litre container.
2. Fill the 3 litre container from the 5 litre container.
3. Empty the 3 litre container.
4. Pour the 2 litres left in bigger container into the smaller container.
5. Fill the 5 litre container.
6. Fill the 3 litre container from the 5 litre container.
 That takes 1 litre and leaves 4 litres in the bigger container. Pour the 4 litres into the aquarium.
17. Hints:
1. Divide 107 by 5, round off and use this number in the third position as the starting point.
2. Guess and check to find the numbers.

Answer is: 12 14 26 27 28

18. 24 skaters

REFERENCE LIST

Bibliography

1. Canadian Banker's Association, Money In Your Life, P.J. Spratt and Associates, Toronto, Ontario, 1981.
2. Ebos, Frank et al, Mathematics Problem Solving Activities, Books for Grades 3, 4, 5 and 6. Houghton Mifflin Company, Toronto, 1978.
3. Gladstone, David et al, Math Problem Solving Kits 1 and 2, Holt Rinehart Winston (Canada) Limited, Toronto, Canada.
4. Greenes et al, Problem Solving Decks, Dale Seymour Publications, Distributor - G.L.C./Silver Burdett Publishers, 115 Nugget Avenue, Agincourt, Ontario, M1S 3B1, 1980.

Decks

- Deck A - Grade 3
- Deck B - Grade 4
- Deck C - Grade 5
- Deck D - Grade 6

5. Harnadeck, A., Mind Benders - Deductive Think Skills, Series Titles: A1, A2, B1, B2, C1, C2, and Warm Up Mind Benders, Kahl's Incorporated, P.O. Box 126, Kitchener, Ontario, N2G 3W9, 1978-79.
6. Higgins, John L. and Sachs, Larry A., Mathematics Laboratories: 150 Activities and Games For Elementary School, Eric Information Analysis Center for Science Mathematics and Environment Education. The Ohio State University, 1800 Cannon Drive, 400 Lincoln Tower, Columbus, Ohio, 43210, 1974.
7. Immerzeel, George et al, Problem Solving Cards and Support Manuals, Grades 5 and 6. Iowa Problem Solving Project, Price Laboratory School, University of Northern Iowa, Edgar Falls, Iowa, 50613, 1978.

Sets

- Problem Solving Using Guesses
- Problem Solving Using Computation
- Problem Solving Using Tables
- Problem Solving Using Resources
- Problem Solving Using The Calculator Book I
- Problem Solving Using The Calculator Book II
- Problem Solving Using Calculator Codes, Book I
- Problem Solving Using Calculator Codes, Book II

8. Immerzeel/Ockenga, Heath Mathematics Wordbook, Books for Grades 1, 2, 3, 4, 5, and 6. D.C. Heath and Company, Toronto, 1981.

9. Jrulik, Stephen et al, Problem Solving In School Mathematics, National Council of Teachers of Mathematics, Reston, Virginia, 1980 Yearbook.
10. Judd, Wallace J., Problem Solving Kit, Science Research Associates, Toronto, Ontario, 1977.
11. Kelly, B., Co-Basal Mathematics Kits, Hayes Publishing Company, Burlington, Ontario, 1979.

Kits

- Set 3 for Grade 3
 - Set 4 for Grade 4
 - Set 5 for Grade 5
 - Set 6 for Grade 6
12. Kelly, Brendan, Problem Solving A, B, and Problem Solving, Hayes Publishing Limited, Burlington, Ontario, 1980, 1980, 1981 respectively.
 13. Kelly, B., Power Math Problem Solving Kit, For Grades 4, 5 and 6, Hayes Publishing Company, 1160 Blair Road, Burlington, Ontario, 1979.
 14. Lerch, Harold H., Active Learning Experience for Teaching Elementary School Mathematics, Houghton Mifflin Company, Toronto, 1981.
 15. Manitoba Department of Education, Problem Solving Resource Book 1980. 404-1181 Portage Avenue, Winnipeg, Manitoba, R3G 0T3.
 16. Morris, Janet, How To Develop Problem Solving Using A Calculator, National Council Of Teachers Of Mathematics, Reston, Virginia, 1981.
 17. National Council Of Teachers Of Mathematics, Arithmetic Teacher, Reston, Virginia, (Journals)
 18. Ohio Department of Education, Problem Solving - A Basic Mathematics Goal, 1. Becoming A Better Problem Solver; 2. A Resource For Problem Solving, Columbus, Ohio.
 19. Patzer et al, Problem Solving, Department of Education, 404-1181 Portage Avenue, Winnipeg, Manitoba, R3G 0T3, 1980.
 20. Randall, Charles et al, Teaching Problem Solving - What, Why & How, Dale Seymour Publications, Palo Alto, CA, 1982, Distributed by G.L.C., Silver Burdett, Agincourt, Ontario.
 21. Schaaf, Oscar, Problem Solving In Mathematics, Grades 4 to 9, Lane Educational Service District, Box 260, Eugene, Oregon, 97402.
 22. Schminke, C.W. Dumas Enoch, Mathematics For Child Involvement, Third Edition, Allyn and Bacon, Incorporated, Toronto, 1981.
 23. Sentlowitz, Michael et al Baseball, A Game of Numbers, Addison Wesley Publishing Company, Don Mills, Ontario, 1977.

24. Walter, Marion, I., Boxes-Squares and Other Things, National Council of Teachers Of Mathematics, 1906 Association Drive, Reston, Virginia 22091, 1973.
25. Weber, K. J. Thinklab and Thinklab 2, Science Research Associates, Toronto, Ontario, M2H 2S6, 1974, 1976 respectively.